OGY DEPARTMENT

THE PAPER INDUSTRY and PAPER WORLD

N EDUCATIONAL NEWS MAGAZINE — JANUARY, 1947

OFOME MIX BOX

Welded Construction

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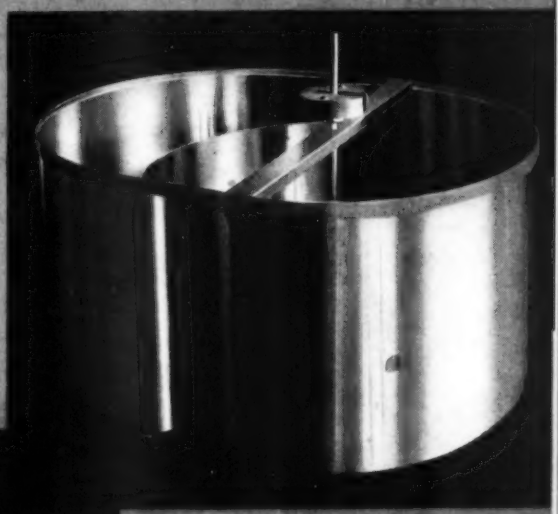
DETROIT

ZENS INSTALLED AND ON ORDER



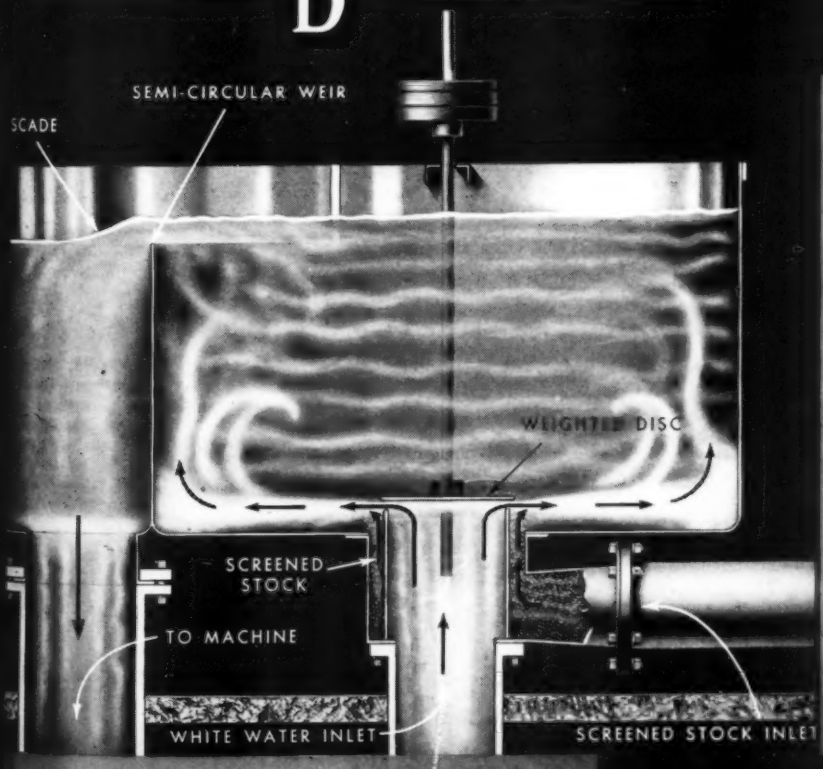


Diagram shows how the stock enters the side of the Mixing Head, while water enters through the bottom. A weighted cap over the white water inlet causes the flow to change direction and fan out horizontally around the entire 360° of the periphery, like holding your hand against an open water faucet. This water literally "knifes thru" the ring of stock rising around the white water inlet and actually pares off the stock. Thorough mixing is thus assured, especially since the pressure causes the mixture to spread out around the entire bottom of the box. The mixing chamber is big enough to detain the stock about 12 seconds, thus the entrained air has ample time to escape as the mixture slowly rises and very thinly passes over the weir. Box is set quite low, as compared with old installation, in order to prevent cascading and the pick-up of air. For more information, write *The Downingtown Mfg. Co., Downingtown, Pa.*

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THE RESINOUS PRODUCTS & CHEMICAL COMPANY

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Objective: Higher Speeds

Lloyd Hornbostel, vice-president in charge of engineering, is here seen consulting with T. Vickerman in Beloit's new engineering department. (Mr. Vickerman has been with this company 19 years.) Paper machines run faster, operate more efficiently, because of Beloit engineers' close daily contact with the *details* as well as the big innovations of improved design. *Beloit Iron Works, Beloit, Wisconsin.*

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WHEN YOU BUY BELOIT...YOU BUY MORE THAN A MACHINE!

OLIVERS...at KVP

This is the mill making the headlines right now in Canada and the States. It's a community rehabilitation job and mill construction project of the first order, carried out with great thoroughness and attention to detail. It's significant that in planning the new and up-to-date sulphate mill, Oliver Ringvalves were selected for the pulp washing filters.

Perhaps the most interesting part of this diversified filter installation is the set-up of the four Ringvalve Filters, each equipped to separate strong and weak wash liquor. It consists of two lines, each with two filters in series washing counter-currently. The weakest wash liquor works its way back to the head of the line, becoming stronger with each step. Used finally as the first wash on the primary filter, it emerges as strong liquor going to the evaporators.

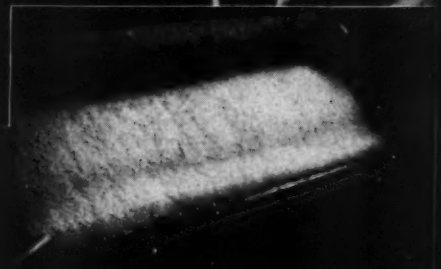
All of the Oliver United Filters mentioned above together with Oliver Bleach Washers, High Density Thickeners and Board Forming Machines are so well-engineered and so adaptable to pulp and paper mill operations that every company requiring filters should give these filters every consideration . . . as did the authorities at KVP.

four

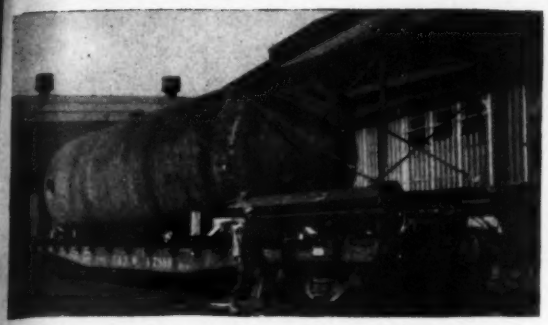
two

one

and two



OLIVER UNITED FILTERS INC.



Above: One of two 9-ft. 6-in. diam. by 40-ft. sulphate digesters we built at our Birmingham plant for a pulp mill in Mexico.

Right: Three 28-ft. diam. by 25-ft. black liquor tanks which we fabricated and erected for a pulp and paper mill.

Modern Equipment for the Modern Mill

CB&I

STEEL PLATE WORK

THE need for greater production from the country's pulp and paper mills requires the kind of efficiency and dependability that you get from equipment designed and built specifically for the job! When it comes to steel plate work, operators can often place their mill in an advantageous position—from the standpoint of steady, high production—by using CB&I-built products.

We build various kinds of steel plate work, including welded steel storage tanks, digesters, steel smoke stacks and elevated steel tanks to provide gravity water pressure for general mill service or for fire protection. All of our plants have facilities for stress-relieving and x-raying digesters and other shop-built structures.

If you are planning on modernizing your mill or expanding your production facilities, write our nearest office outlining your steel plate work needs.

Left: A Marx Conical Saveall at a folding box board mill. It is 48 ft. in diam. at the top, 35 ft. 6 in. high and holds 130,000 gals. of water.

Right: This 125,000-gal. Horton elevated tank provides gravity water pressure for fire protection at a pulp mill. It is 125 ft. to bottom.

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Why you can't buy all the Caustic Soda, Soda Ash, Sodium Bicarbonate and Chlorine you want . . . and what to expect for 1947 and 1948.

Much has been written about the need for more Caustic Soda, Soda Ash, Sodium Bicarbonate and Liquid Chlorine but, to date, little has been done to explain the reasons for the shortage of these products. In the following Question-Answer columns, Mathieson endeavors to tell American industrialists just why they can't get all they want of these vital chemicals . . . and what the 1947-1948 outlook is for alkali and chlorine production.

Q. *Why are caustic soda, soda ash, sodium bicarbonate and chlorine now in short supply when there was an ample supply before the war?*

A. Expansion of the alkali-chlorine industry during the war *was not permitted* (except to produce an insignificant tonnage) because of the critical shortage of materials that would have been needed for this construction. However, during the same war period, alkali-consuming industries, such as aluminum, rayon, textiles, chemicals and glass food-containers, and chlorine-consuming industries, such as DDT, synthetic detergents and plastics, were allowed to expand their production or construct new facilities. These will continue as growing peace-time consumers.

Q. *Was there less alkali for consumers in 1946 than in 1945?*

A. During 1946 there was less tonnage available than in 1945 due to interruptions in production caused by coal and other strikes. If these interruptions do not recur, there should be some increase in alkali tonnage supply for 1947, but certainly not enough to meet the increased demand.

Q. *How much alkali and chlorine are being exported?*

A. Practically no chlorine. Only a negligible fraction of the pre-war tonnage of caustic soda, soda ash and sodium bicarbonate is now being shipped out of this country.

Q. *Is there any idle capacity in the alkali and chlorine industry?*

A. Only four small government-owned caustic-chlorine plants. Two of these plants have finally been leased to private industry and will be placed in operation in early '47. This additional tonnage is only a "drop in the bucket" when measured in terms of the overall shortage.

Q. *Are alkali and chlorine producers expanding their facilities?*

A. Yes, several producers, including Mathieson, are expanding facilities for one or more products. Some of this expansion was started immediately following VJ Day. But the special heavy equipment necessary (boilers, kilns and turbines) is as high on the industry shortage list as are alkali and chlorine . . . result: expansion cannot possibly be completed until late '47 or early '48.

THE MATHIESON ALKALI WORKS (INC.)
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CHEMICALS

Caustic Soda • Soda Ash • Bicarbonate of Soda • Liquid Chlorine
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THE PAPER INDUSTRY and PAPER WORLD

(Reg. U. S. Pat. Off.)

VOLUME 28 - - - - JANUARY, 1947 - - - - - NUMBER 10

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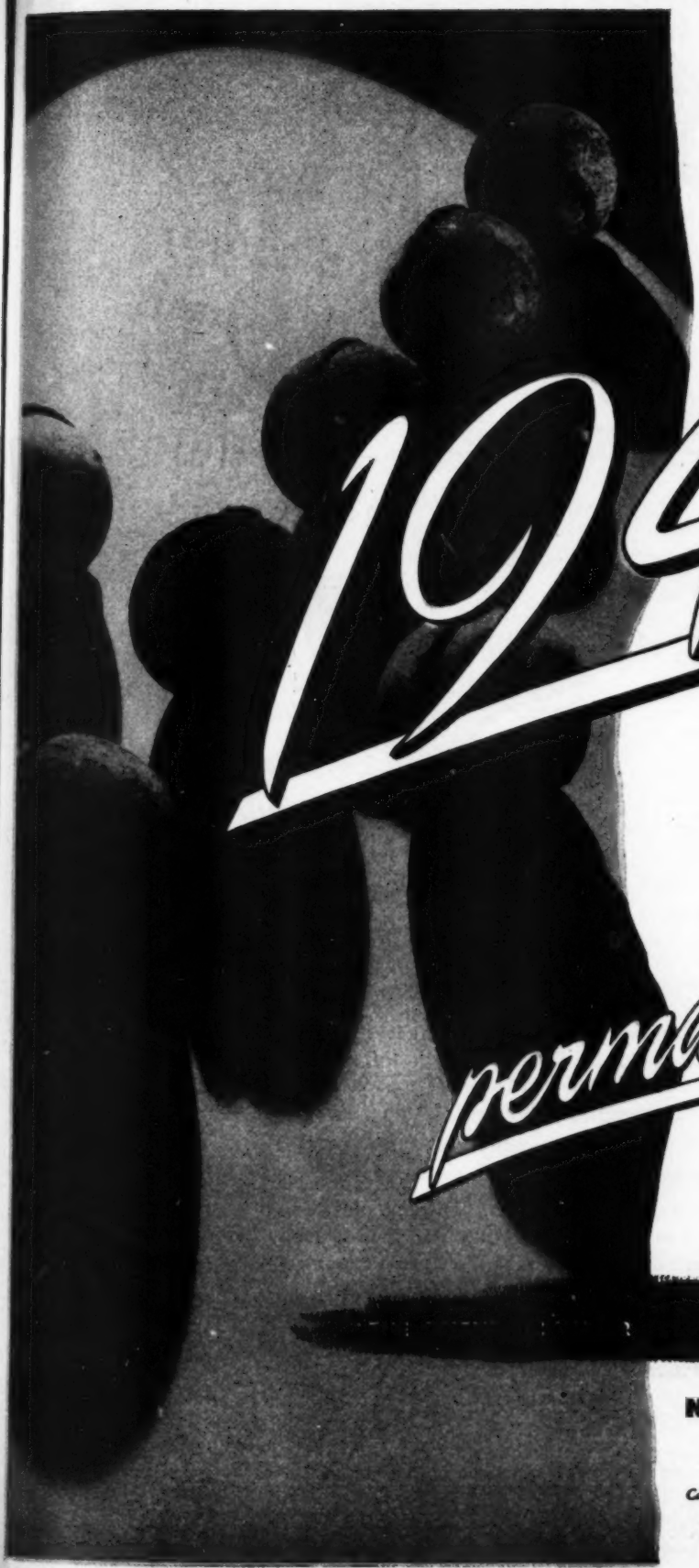

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Designed for rapid yard work, the Aero-Crane goes anywhere a truck can go. You can travel it light or loaded with boom in any position. Tough-built, with anti-friction bearings throughout, electric welded construction, non-burn clutches, Air-controls, Aero-Crane keeps going free of breakdowns—pays for itself in saved man-hours.

Built in a range of eight models. Capacities of 3,500 to 60,000 lbs. at 12 foot radius. Diesel or gasoline powered.

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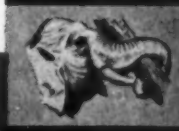

POWER

ORTON CRANE & SHOVEL CO.

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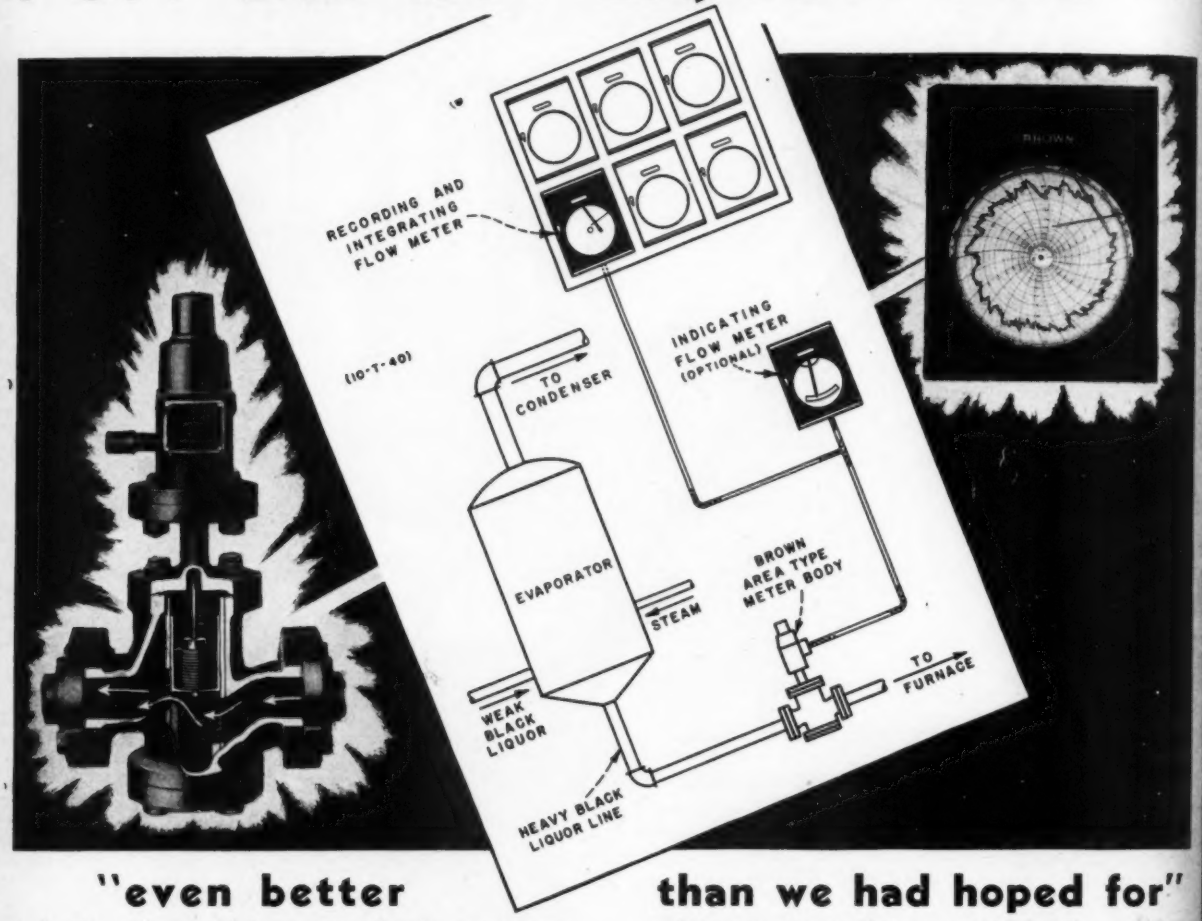
FOR BLACK LIQUOR FLOW



"even better than we had hoped for"

In the soda or sulfate process of pulp manufacture, black liquor flow measurement is important. It is the key to measuring the efficiency of recovery operations.

Until the Brown AREA TYPE Flow Meter was developed for this application, there was no really satisfactory method of measuring black liquor flow. Other types of flow meters were inaccurate, they clogged and required almost constant maintenance.

The Brown AREA TYPE Flow Meter eliminates all these problems. Recently at one major paper mill, the meter was completely examined AFTER ALMOST A YEAR AND A HALF OF CONTINUOUS OPERATION . . . and found it as good as the day it was installed. One executive said, "Performance is even better than we had hoped for."

The Brown AREA TYPE Flow Meter fits in your line like a valve. No external piping is required. The recording instrument (and indicator, if desired) can be located at any remote point because it is connected to the meter body by a simple three-conductor wire circuit. The recorder makes a record of rate of flow and it totalizes flow.

Find out more about this instrument which has proven so valuable to other paper mill operators. Further information on the Brown AREA METER for Black Liquor Flow will be sent to you without obligation. Write today.

THE BROWN INSTRUMENT COMPANY, a division of Minneapolis-Honeywell Regulator Company, 4489 Wayne Avenue, Philadelphia 44, Pa. Offices in all principal cities.

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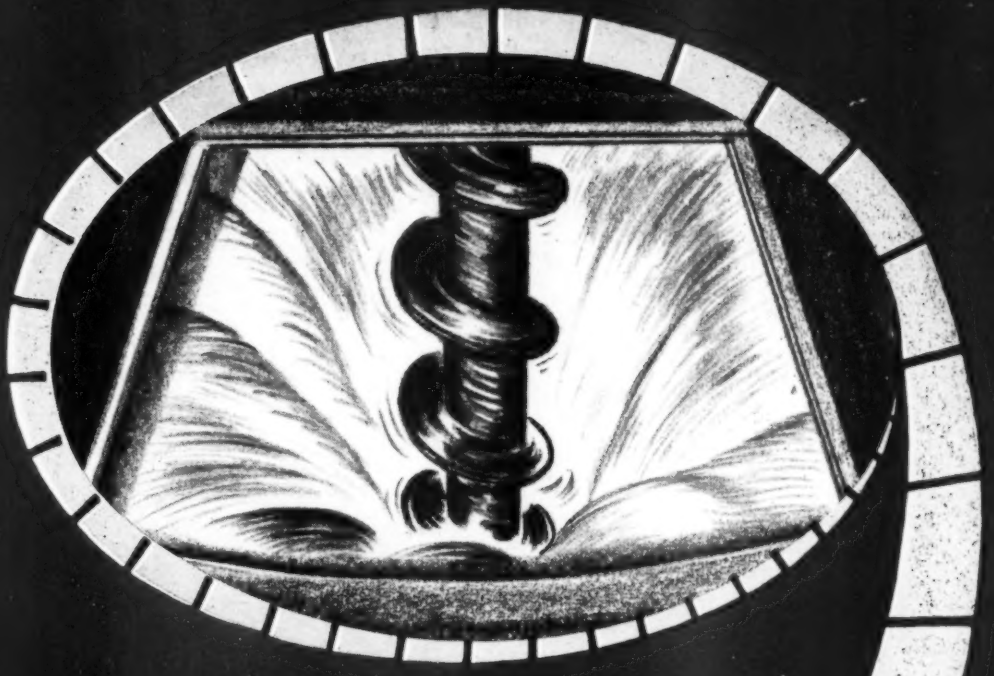
THE VALLEY-VORTEX PULPER



. . . introduces a <u>new</u> combination
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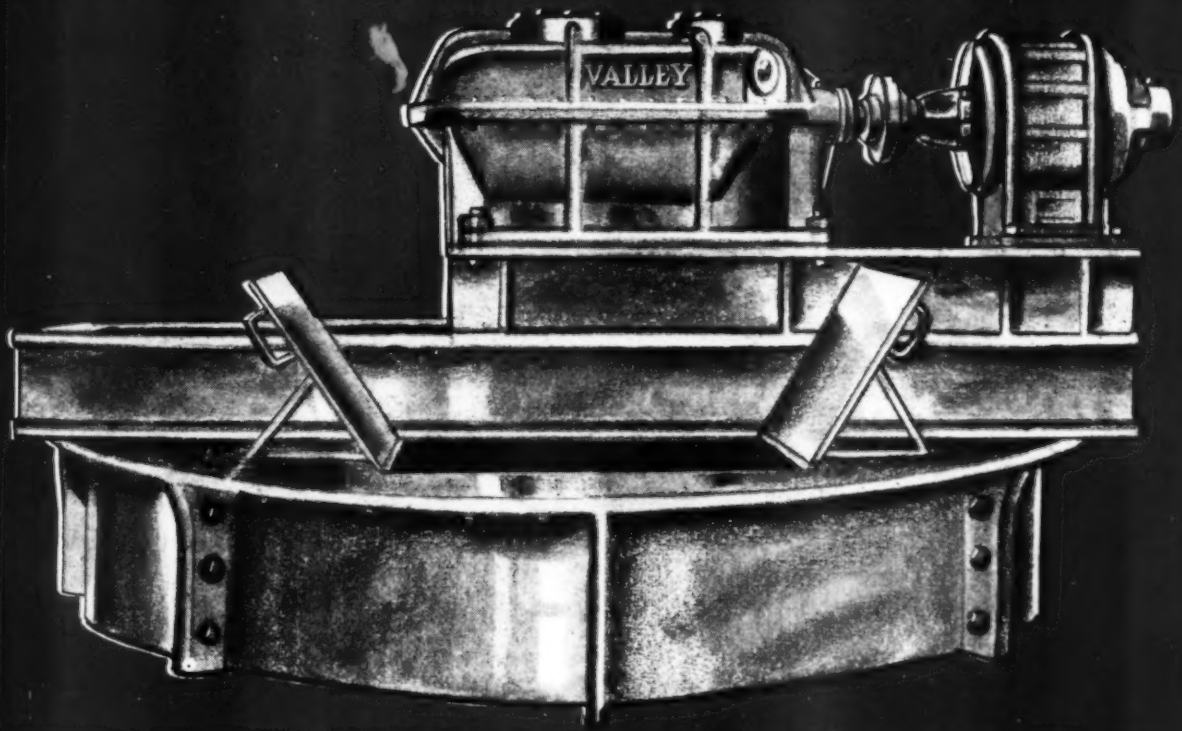
in <u>ONE</u> GREAT PULPER



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Hyster models range in capacity from 2000 lbs. to 30,000 lbs. All models are *pneumatic tired*, gasoline powered, engineered and built for fast, efficient, enduring service.

Illustrated literature sent gladly.

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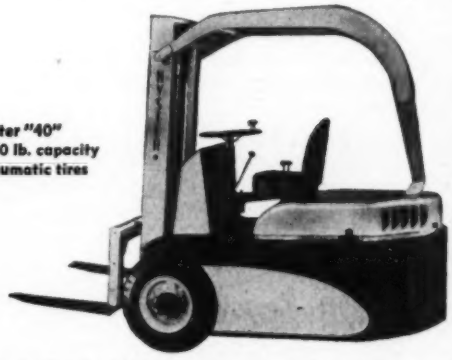
2000 lb. capacity
Pneumatic tires



Hyster "40"
4000 lb. capacity
Pneumatic tires

Hyster "75"
7500 lb. capacity

Hyster "150" (not shown) has 15,000 lb. capacity
Pneumatic tires

Hyster Karry Krane
10,000 lb. capacity
Pneumatic tires
Mobile crane truck with adjustable boom

Hyster Straddle Truck "M"
12,000 lb. capacity

Model "MH" (not shown) has 30,000 lb. capacity
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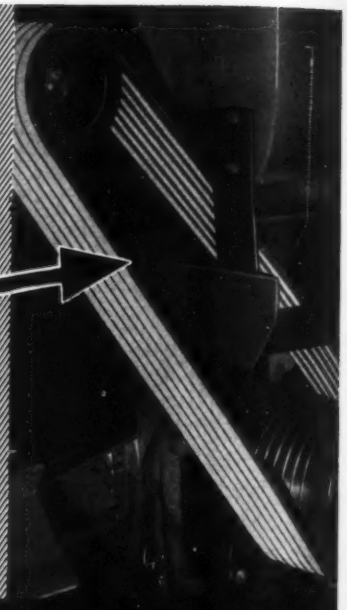
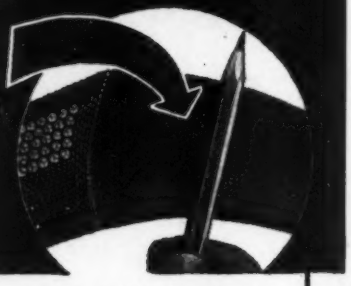


The moment you look at a V-Belt in its sheave you see at once that the *sides* of the belt do all the gripping on the pulley and get all the wear against the sheave-groove wall.

Notice, too—it's the *sides* that pick up all the power delivered by the driver pulley. The sides *transmit* that power to the *belt as a whole.* And then, once more, it's the sides—and the sides *alone*—that grip the driven pulley and *deliver* the power to it.

That's Why The FACT That the CONCAVE SIDE (A GATES PATENT) *REDUCES* Sidewall *WEAR* Is IMPORTANT to You!



The fact that the *side* is the part that does the work and gets the wear explains why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out *first.* Naturally, then, when you lengthen the life of the sidewall you lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, *straight-sided* V-Belt gets excessive wear along the *middle of the sides.* They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Longer Sidewall Wear Is NOW MORE IMPORTANT Than Ever Before!

Now that Gates Specialized Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

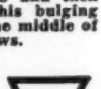
THE GATES RUBBER COMPANY, DENVER, U. S. A.
World's Largest Makers of V-Belts

Straight Sided V-Belt

How Straight Sided V-Belt Bulges When Bending Around Its Pulley

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall



Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

471

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

Gates
THE MARK OF SPECIALIZED RESEARCH

INCIDENTS FROM SMITHway PRESSURE VESSEL RESEARCH

PROJECT No. 33,117

Nonferrous weld ductility increased from 16% to 40%

IN metallic arc-welding of heavy plates of certain nonferrous metals—phosphor-bronze, for instance—metallurgists long since found that commercially available electrodes produced welds of uncertain quality.

Such welds tend to be high in porosity, low in ductility, and are subject to cracking.

These three shortcomings severely limited the use of arc welding for the fabrication of pressure vessels which were to be subjected in service to high temperatures and to high pressures.

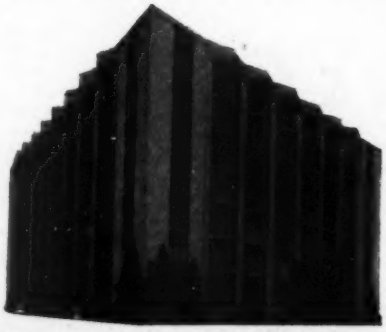
During the late war, however, the ability to weld nonferrous heavy plate satisfactorily became so vitally important that several of the A. O. Smith laboratories began a concentrated study on the subject.

Their answer was relatively simple and conclusive. By three carefully controlled techniques they eliminated porosity, overcame the tendency to crack, and they increased ductility from an average of 16% elongation in a two-inch gage-length to a new high of 40%, *without loss of tensile strength.*

The techniques employed included pre-treatment of the welding electrodes, followed by a closely controlled pre-heating procedure and welding sequence,

and concluding with a unique form of post-welding treatment of each welding pass.

The important fact, however, is that through immediately available integrated research, another pressure vessel fabrication problem was solved promptly, successfully, and practically.



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(Photo courtesy the Atlanta Journal)

Memorial to
a Paper Scientist's Genius

Governor Arnall, of Georgia (left), and Charles H. Herty III view bronze memorial set in a niche in the State Capitol in Atlanta

TRADE WINDS

B-F-D Company Completes Renovation of Ogdensburg Mill

▸▸▸ THE RENOVATION OF the sulphite and groundwood sections at the plant of the former Algonquin Paper Company, in Ogdensburg, New York, has been completed. The mill was purchased by B-F-D Company in the latter part of 1944 (Cf. P.I. and P.W. Nov. 1944. The 212-in. paper machine was sold to the St. Regis Paper Company and has been reinstalled at their Deferiet mill. The shortage of groundwood and sulphite for paper manufacture and the company's desire to be assured of an adequate supply of fibers for continuous operation at the paper mill at Plattsburg, made it desirable to resume operation of the pulp mills as rapidly as possible. The grinders were put into operation in January, 1946, but it was necessary to make extensive repairs and additions to the sulphite mill so that a satisfactory grade of pulp could be manufactured. This work has been completed and pulp is now being made in sufficient quantities to assure continuous full operation at Plattsburg. A production of 130 tons per day of sulphite is anticipated.

The renovation at the sulphite mill is of particular note as an example of the application of the latest equipment and methods to an old mill. This work included a new acid system; digester circulating system; reconstruction of the blowpits and installation of agitators in conjunction with a water blow system; a pulp washer; rifflers; screening system; thickener; and pulp press and laping machine. New piping was required as well as electrical distribution for both power and lighting. The chippers, chip screens, and chip bins were considered satisfactory for the initial operations. All of the new washing and screening equipment is located in the former screen building. The wood handling system is being used with the addition of two barking drums. Additional facilities are to be installed in the near future, including two 12 x 45 drums and additional wood storage and handling facilities.

Acid Making

The acid system was completely overhauled under the direction of Chemipulp Process, Inc.

Digester House

The four 15 ft. x 45 ft. digesters were relined and the piping renewed. There was a hot acid system already installed. A Chemipulp circulating system and provisions for a water blow were added, as well as a Chemipulp chip packer.

Blowpits

As originally built, there were four 41 ft. x 18 ft. x 17 ft. blowpits. These were relined and interconnected. Agitation, consisting of three 60-inch adjustable pitch propeller agitators driven by 60-hp. motors through Falk reducers, was installed in each blowpit. Through the use of the water blow and showers at the ends of the blow lines, in use during the blow, the stock is brought to 3.5 per cent consistency. The blowpits normally operate in pairs, but all can be interconnected through the brick catcher.

STATE OF GEORGIA GIVES RECOGNITION TO THE LIFE AND WORKS OF DR. HERTY

A small company gathered in the State Capitol, Atlanta, Georgia, on December 17, to view the unveiling of a bronze memorial to the late Charles Holmes Herty, paper research scientist.

The ceremony was simple and as impressive as the inscription on the memorial which reads: "The spark of his genius touched Georgia's pines, and forests of smokestacks began growing in the South."

Charles H. Herty III, young college student, pulled the cord which unveiled the memorial, after which Georgia's Governor Arnall said:

"I am not familiar with the history of all the monuments at the State Capitol, but I will hazard an opinion that this is the first to a citizen who has made his contribution in a field other than public affairs or public office. This is a tangible effort to pay tribute to his life and his efforts which reflected such credit and glory in the name of Georgia."

The Governor then introduced to the group Miss Emily Woodward, of Vienna, chairman of the Herty Memorial Commission. Miss Woodward and her fellow members arranged for the memorial by authority of the General Assembly.

The Herty Foundation Laboratory at Savannah, Georgia, was established by Dr. Herty, and it was there that he developed processes for making paper from Southern pine. The Laboratory is still maintained with a competent staff. Dr. Herty passed away in July, 1938.

Pulp Washing and Screening

The pulp washer and screening system are located in the former screen room and so arranged that all operations can be controlled as a unit through a series of push button stations. The washer is an 8 x 16 rubber-covered Impco vacuum unit. The flow is controlled ahead of the washer by an Impco stock meter with a DeZurik consistency regulator. Provision has been made for the later installation of a preknotter ahead of the washer and, also, for a second washer in series. The pulp is diluted to 3.5 per cent consistency at the washer repulper. No knotters are used, knots being removed at rifflers.

There are eight new tile line rifflers, 6 ft. x 42 ft. Dilution of the stock is controlled by the Poirier Regulator to 1 per cent and further to 0.35 through control valves from both the white water and fresh water line.

The screening system consists of twelve 14-plate primary screens, six 14-plate secondary screens and three tailing screens. The primary screens are arranged in six lines of two screens each with a 6-ft. apron ahead of each line. Dilution boxes are provided between each of the pairs of screens and no showers are used. The overflow from these primary screens flows to the three secondary screens, which are each in series with a tailing screen, with a dilution box between. The accepted stock from the three tailing series is recirculated to the secondary screens, through a float controlled pump. The stock is diluted to 0.28 per cent in the screening system and flows to an 8 x 12 Impco Vacuum thickener. The white water is pumped to a storage chest for re-use in the washing and screening system. The consistency of the pulp from the thickener is controlled to 3.5 per cent by a Poirier regulator. Two Kamyr machines are used to prepare the pulp for shipment. All of the stock and white water lines in the screening system were prefabricated, using steel, nickel lined pipe. Stainless steel piping was used ahead of the washer.

Engineering and design was by Chas. T. Main, Inc., Boston, except acid system and digester changes which were by Chemipulp Process, Inc.

The operating personnel of B-F-D Company who had direct charge of the work were: J. O. Julson, general manager, Pulp and Paper Division; J. E. Foote, asst. general manager, Pulp and Paper Division; R. A. Baker, technical director; and D. A. Hunter, superintendent of operations.

Equipment

Agitation—Improved Paper Machinery Corp.

Automatic Controls—Mason-Neilan Regulator Co.

Barking Drums—Carthage Machine Co., and Fibre Making Processes, Inc.

Circulating System — Chemipulp Process, Inc.

Consistency Regulators—DeZurik Shower Company and Poirier Control Co.

Flat Screens—Improved Paper Machinery Corp.

Motors and Controls—General Electric Co. and Northeast Engineering, Inc.

Piping—Midwest Piping & Supply Co., Inc., and Michigan Steel Casting Co.

Pumps—Warren Steam Pump Co., Gould Pump Co., and Ingersoll-Rand Co.

Screen Plates—Magnus Metals Corp.

Special Valves—Record Foundry and Machine Co., DeZurik Shower Co. and Magnus Metals Corp.

Stock Meter—Improved Paper Machinery Corp.

Tile Linings—Stebbins Engineering & Mfg. Co.

Washer and Thickener—Improved Paper Machinery Corp.

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BRITISH PAPER NOTES (November, 1946)

▶▶▶ The high cost of esparto grass compared with the relatively low controlled selling price of paper manufactured from this raw material has been the subject for review by the Paper Control. The result has been a new order, Number 79, which allows an increase in the selling price of esparto paper, graded according to furnish. Also, an increase has been allowed in the selling price of the Massey processed, coated paper on an esparto-straw body.

Beyond these rulings, Order Number 79 introduces two novel conditions not previously existing under the Control; the first regards merchant's stocks on hand at the date of the Order. This inventory is to be sold at the prior purchase price. The second ruling deals with all future supplies of esparto-straw paper. Future sales must be accompanied by an invoice which discloses the percentage of fiber furnish.

The regulation dealing with the future sale of esparto paper is an innovation presenting ramifications affecting every papermaker. This is particularly true of the esparto paper manufacturers in Great Britain. Since esparto paper renders a very fine finish, a closely woven surface, and a lack of stretch, making it suited for color registry work, it is well suited to multi-colored printing; hence, it holds a peculiar position in the British paper industry. More than this, and further enhancing its desirability, esparto paper is widely desired in the export market.

A marked weakness of esparto paper in prewar days was its lack of any standard of fiber furnish. General acceptance maintained that the paper should contain at least fifty per cent esparto grass to mark it of esparto quality. Reliable papermakers used up to sixty and sixty-five per cent base, and some used up to eighty per cent (some wood content is desirable to give strength to the paper). However, so-called esparto paper contained only small percentages of the raw material but were sold for esparto quality. It appears, under present conditions, that this near-esparto paper will be recognized along with the true quality paper.

Although the ruling by the Control in favor of an increase in the sale price of esparto paper comes as an assistance to the papermakers, it is questionable that this factor is in pace with other rising costs which the industry must absorb. It would seem as if the increase favoring the esparto paper manufacturers comes tardily in face of rising production costs.

This general upward trend lends support to the current opinion expressed by William Harrison, chairman of Thomas Owen and Company. While accepting the view that price control was necessary for at least another two years until supplies of wood pulp and esparto grass at appropriate prices were assured, Mr. Harrison pointed out that there were abundant supplies of straw in Great Britain. Straw is a material which can be reduced to pulp and processed into good quality paper. The price of straw in the market at this time is 6-5-0 pounds, per long ton. Although this price seems high to Mr. Harrison, and to some farmers, he favored the belief, "If the controlled price of straw to the paper mills was reduced a reasonable amount, straw would then become a permanent raw material for conversion into pulp, and, thus, drastically reduce the very large prewar import of pulp."

The subject of using straw for pulp was debated on several occasions during the war years, and, although there was much to be said in favor of its use, there were three main arguments against using it as a raw material: First, up to the present, straw has not produced such high standard paper as

PAPER · · · America's 6th Industry

PAPER DIAPERS FOR FUTURE PRESIDENTS

(NEWS ITEM: *Paper diapers are now available at neighborhood drug stores.*)

Modern mothers are finding paper diapers more and more among the indispensables for bringing up baby. Made of high wet-strength paper, these soft filmy diapers are impregnated with a light antiseptic baby oil during manufacture. Paper diapers are especially acceptable because they are disposable. Each diaper arrives scientifically sanitary. Names of manufacturers furnished gladly on request.

Paper sacks for chemicals . . . paper cans for frozen food . . . paper tape for recording sound . . . new uses for paper calling for new standards of lightness and toughness, new standards of quality in performance. New responsibilities — new opportunities for the Pulp and Paper Industry.

The Puseyjones Organization is now devoting itself completely to the design and construction of Paper-Making Machinery built to new high standards of speed and efficiency, and to the modernization of existing machines.

Among the new machines under construction by Puseyjones are three of the largest and fastest Fourdrinier Machines, one for white paper for bags, one for Kraft liner board, and one for Kraft paper for multi-wall bags; also one Cylinder machine of record size and speed for the manufacture of floor covering felt. Other machines are under construction for the manufacture of M. G. Kraft specialties, facial tissues, and high grade bristols.

Puseyjones Engineers will welcome the opportunity to work with you in solving production problems.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
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compared with that quality obtained by using esparto grass. Second, the yield of straw is less than the yield from grass. Third, the use of straw was limited to the esparto mills which possessed the necessary boiling plant. Frequently, it has been suggested that boiler plants be located in the proximity of farm lands producing straw, and so aid in the processing of sufficient pulp to supply a great number of wood pulp consuming mills. On the other hand, the virtue of using home produced straw as a papermaking raw material would disappear if the cost of esparto grass or wood pulp would return to near normal.

Meanwhile, the position of the British paper industry offers no signs of improvement, and it would seem that at last the government has decided to take the country into its confidence. Appeals are being made to industries to encourage greater production. Unfortunately, nationalization of one industry after another is taking place at the same time as the appeals for production. Together with this, there is real alarm expressed over the shortage of raw materials. Individual instances have been reported of many manufacturing plants closing due to the materials shortage. Serious warning has been issued to several industries by the official government publication, the *Board of Trade Journal*, and the paper industry is among those to whom the warning has gone out. The warning prevails upon the industries affected to exercise caution in hiring additional personnel until the end of next year. Unemployment is a consequence of the raw material shortage.

Trade leaders and the trade press are constantly watchful of this acute material shortage. It was believed that a return of prewar coal imports from the Scandinavian countries would change the production picture in Great Britain. Hopes in this direction are no longer entertained. It would appear that the Scandinavian nations will be unable to meet the demands of the European nations or of any other nations, and Grenville Becket, president of the Paper Makers' Association shares this doubt.

In the opinion of some, a situation aggravating the raw material shortage is the demand of backward countries for the much needed materials. It would seem that a world-wide position is developing similar to the condition which existed in Britain in 1861 when there were repercussions following the "Taxes on Knowledge." These taxes were levied on newspapers, advertisements, and paper. The subsequent demand for paper raw materials when the taxes were lifted was so great that there was a shortage of linen and rags. As a result of this shortage, esparto grass, chemical and mechanical pulp came into being. The possibility of developing new raw materials is remote, but, at least, three sources of raw materials are being examined. Straw pulp can be produced by all nations, esparto grass can be obtained from Africa, and bamboo pulp can be produced in India. At this stage, India has only been suggested as a possible source, since no experiments have been carried on in the use of bamboo as a pulping material.

In the midst of the materials shortage and paper shortage, the Board of Trade Returns for October indicate an appreciable advance over the two previous months. The total for the export of paper and boards reached 14,542 tons compared with 8,985 tons for September. Total exports for the period, January to October this year, have been 92,687 tons compared with 124,534 tons for the same period in 1938. This figure represents a percentage of seventy-four per cent for this year as against the previous high of sixty-one per cent. The highest rises in exports were noted for newsprint, transparent cellulose, and coated papers and boards.

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PACIFIC PAPERBOARD CO. SELLS LONGVIEW PLANT

Sale of the box plant of the Pacific Paperboard Company in Longview, Washington, to the newly formed Associated Paper Box Company (also of Longview) has been announced. The Pacific Paperboard Company will continue to supply material for the plant, and the new management plans to increase production.

The new firm has been incorporated with a capitalization of $250,000, and Charles Ruble, president of the Standard Paper Box Corporation, Los Angles, has been elected president; John Manners, owner of the Paperbox Company, Oakland, California, is vice president; Raymond Miller, vice president of Standard Box Company, has been named secretary-treasurer.

◆

PAPER SITUATION STILL WATCHED BY GOVERNMENT

Uncle Sam's difficulties in securing paper are still troubling the Public Printer, A. E. Geigengack, even though the response to the Government's call for bids for the first quarter of 1947 was somewhat more encouraging than during the last quarter of 1946. Although the quantity of paper offered was materially higher than for the fourth quarter of 1946, when bids were received for only a third of the requirements, the current offerings are hedged with more than the usual specifications, particularly by provisions for payment. No bids were received for newsprint, but the American Newspaper Publishers Association has arranged with four producers for sufficient paper to print the *Congressional Record* and other Government publications using this grade.

Meanwhile, Mr. Geigengack says he has had little success in his efforts to purchase existing paper mills for Government operations.

The classic campaign of the Forest Service to secure the establishment of a paper industry in Alaska has been revived, this time in a statement by J. A. Krug, Secretary of the Interior. He says conversations have been under way for several months with several groups which are interested in the potentialities of the Alaska area. It is even suggested in some quarters that the Government will build a mill in that region if private interests do not act. Mr. Krug's statement says there is abundant waterpower, and that there

R. A. DIEHM WILL HEAD NEW RESEARCH PROGRAM FOR THE WARD PAPER COMPANY

A new program of research development has been inaugurated at the Ward Paper Company, Merrill, Wisconsin, according to an announcement by D. B. Smith, general manager.

R. A. Diehm, who has had twenty years experience in the fields of applied research and product development, will head the new department. For the past year, Mr. Diehm was technical director of the Cuneo Press, Chicago, and preceding that post, he served with the Container Corporation of America in a similar capacity for three and a half years. Mr. Diehm gained his early experience with the Rohm & Haas Chemicals of Philadelphia, where he spent thirteen years.

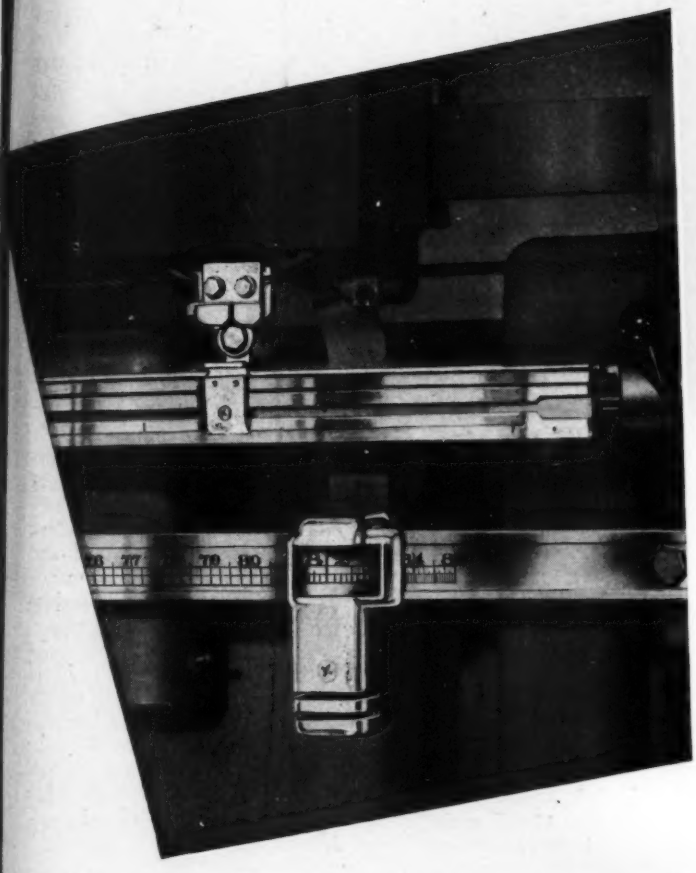
Miss Carola Tritten has been appointed research chemist for the Ward research development. Her former associations have been with the Appleton Coated Paper Company's laboratories and the wartime research staff of Container Corporation of America.

Chief engineer for the Ward Paper Company's recently added research department will be Floyd W. Nienow, who has been with the Pennsylvania Salt Manufacturing Company of Philadelphia, for the past seven years.

In announcing the Ward company's new department, Mr. Smith indicated that technical and chemical research will play a predominant role in the expanding activities of the firm.

NOW . . . A LINE OF PAPER CUTTING MACHINES WITH

Even Faster Automatic Spacers



That's why Trimming is SPEEDIER . . . SURER . . .

WITH A

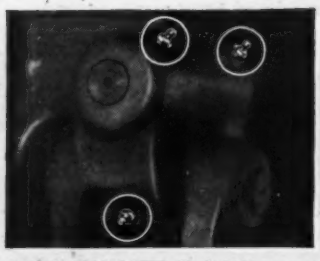
Seybold "Sixty"

Smoothly, rhythmically—even faster and more accurately than ever before—the new Seybold "Sixty" Auto-Spacers automatically move heavy piles of stock into position for one cut after another. Makes it possible to cut more reams of paper per day.

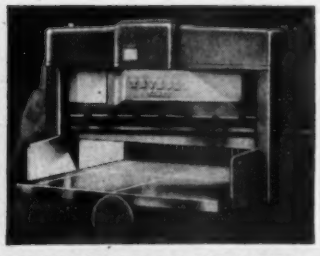
The stops for several different jobs can be set at one time, on one spacer bar —with absolute assurance that, as these jobs come up again, they will be trimmed *exactly* as before.

And when, to this kind of time saving, you add these advantages: Faster adjustments; More convenient lubrication; Better illumination; Traditional Seybold precision and ruggedness — this new Seybold Auto-Spacer is *really* worth looking into.

ONTROLLED BY FOOT PEDALS: A mple pumping motion changes clamp- g pressures instantly. No tools are need- . Saves time. Saves energy. A shadow ge registers the pressure reading.



EASILY LUBRICATED: Zerk fittings are provided for cleaner, easier, more permanent lubrication. Lubrication points are out in the open, encouraging more thorough lubrication.



FLOODLIGHTED TABLE AND GAUGE— MAGNIFIED MEASURING BAND: Less operator fatigue. Greater safety. Less chance for errors. Greater production of more accurately-trimmed work.

SIMPLE, QUICK KNIFE ADJUSTMENT: A turn of the knurled collar on pull bar adjusts knife to cutting stick. No tools are necessary. Self-locking. Adjusts to the thickness of one sheet.

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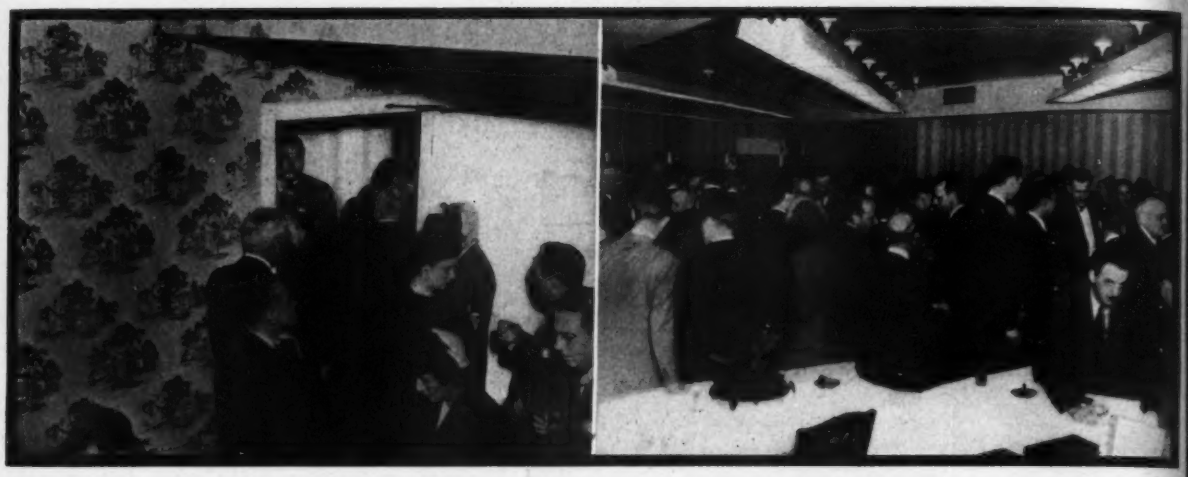

At the formal opening of the new offices of United Wallpaper, Inc., Merchandise Mart, Chicago, visitors saw displayed the newest effects in decorative wallpaper. Each private office has a different wall treatment, with harmonizing floor coverings

is adequate pulpwood timber in the Tongass National Forest of over 16,000,000 acres. The Forest Service sees a potential output of 800,000 tons of sulphate pulp a year or over 1,000,000 tons of newsprint. According to these figures, a plant to employ 1,050 persons would cost $20,000,000. Commercial interests, however, point out the difficulty of establishing a community of this size in the Alaska area.

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FINANCIAL

▶▶▶ Wide fluctuations marked the course of the nation's securities markets during the year just closed. The end of the war was followed by upsurges in prices, but strikes and disturbing economic conditions caused some severe recessions. The spread between the highest and lowest quotations during the year was materially broader than in normal years, and the year ended with industrial averages somewhat lower than the averages a year ago.

Crown Zellerbach Corporation—Net profit for six months ended October 31 was $5,740,625 as against $3,676,732 a year ago.

Gaylord Container Corporation—Net profit for nine months ended September 30 was $3,008,818 as against $742,473 for the same period in 1945.

Hudson Pulp & Paper Corporation—Net income for the fiscal year ended August 31 was $465,947 as against $342,918 for the previous year.

International Paper Company—The common stock has been placed on a $3 per year dividend basis, thus compensating holders of the preferred shares which were called and for which stockholders were able to secure common in exchange.

Marathon Corporation—Net income for twelve months ending October 31 was $2,734,034.

UNITED WALLPAPER, INC., OPENS NEW CHICAGO OFFICE

The twenty-second, twenty-third, and twenty-fourth floors of Chicago's Merchandise Mart house the new offices of United Wallpaper, Incorporated. Beginning last August, United began moving into its new quarters which have been designed and remodled for maximum efficiency. According to William H. Yates, company president, all administrative and studio personnel of the home office are located in the new offices and a more complete co-ordination of all departments is possible.

Official opening of the United offices took place on December 13, when the company entertained its customers, suppliers, and received press representatives in a tour of its new quarters.

Outstanding feature of the new offices is the use of wallpaper throughout as a decorative motif. From reception room, through the corridors, general offices and departmental and executive offices, the wallpaper manufactured by United has been used to develop attractive decorative schemes. Each private office has been wallpapered in a different scheme to blend with its carpeting, as has each of the general offices. The latest colors and patterns of wallpaper developed by the company have been used and over-all efficiency of the office arrangement has been enhanced with colorful and pleasant decorativeness.

Oxford Paper Company—Net profit for the first nine months of 1946 was $1,092,865 as against $623,594 a year ago.

Puget Sound Pulp & Timber Company—Declared a dividend of 25 cents a share on common stock, maintaining the rate paid in recent quarters. It is payable on Dec. 30 to stockholders of record Dec. 19.

Rayonier, Inc.—Net income for six months ended October 31 was $1,619,145 as against $758,785 for the same period in 1945.

Rhinelander Paper Company—Income for the nine months ended September 30 was $782,511 as against $518,203 for the same period in 1945.

Stock Flotations and Ownership Changes

Formal offering has been made of $15,000,000, par value, in first preferred stock, known as 4.40 per cent Series A, by the St. Regis Paper Company, thus carrying forward the negotiations for the purchase of three mills from Time, Inc. (See item in this section.)

Hummel-Ross Fibre Corporation—The Board of Directors has closed negotiations with the Continental Can Company, Inc., for the sale of the Hummel-Ross Fibre Corporation, the plans being subject only to ratification by the stockholders February 4. Under the pending program, stockholders of Hummel-Ross will receive three shares of Continental common for each four shares now held of Hummel-Ross. At current prices, the Continental stock to be awarded is over $11,000,000, while the value of Hummel-Ross securities is about $8,000,000. Before the final transfer, the Hummel-Ross preferred stock will be redeemed and retired.

Peavey Paper Mills, Inc.—The Milwaukee Journal has purchased a minority interest in the Peavey Paper Mills at Ladysmith, Wisconsin. The mill will manufacture newsprint for the Milwaukee publication, in addition to its toilet paper operations, as soon

SUTHERLAND

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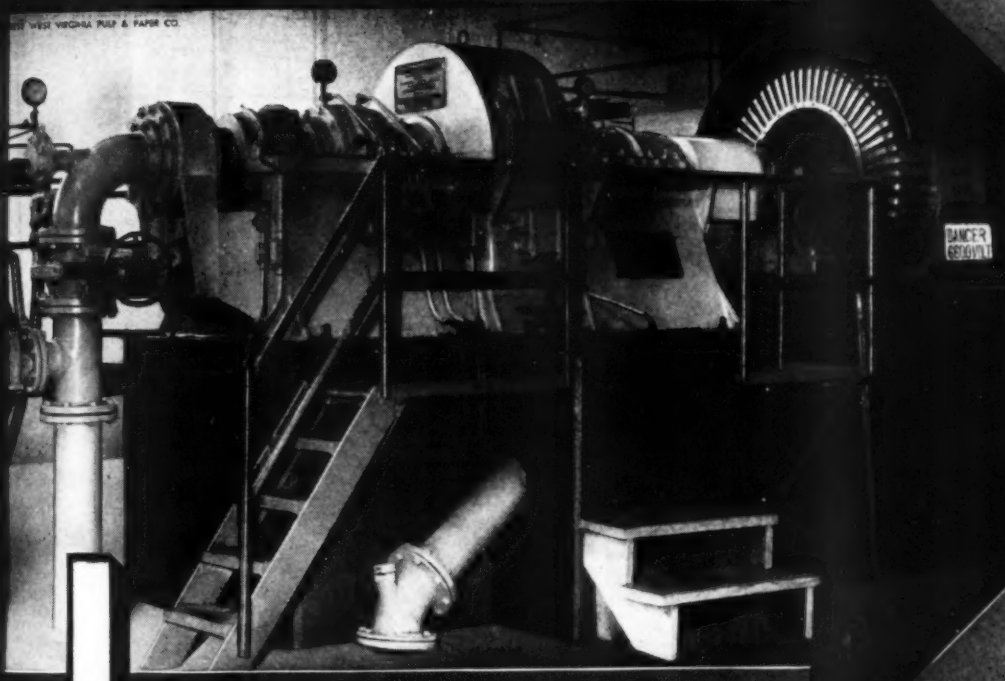
BEATING and REFINING System



LOOK to the Future

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as equipment changes can be made.

Puget Sound Pulp and Timber Company—The War Assets Administration has sold to the Puget Sound Pulp and Timber Company, a Bellingham, Washington, alcohol plant which was operated during the war by the purchasing company. The plant, which produces alcohol from waste sulphite liquor, was sold for $450,000.

United States Gypsum Company—A registration statement for the sale of $24,000,000 in $20 par common stock for the financing in part of the company's $42,000,000 expansion program.

New York Stock Exchange—Stocks

	Closing Prices Dec. 31, 1946	Nov. 25, 1946	Dec. 31, 1945
A.P.W. Products..	5	*4¾-5	8¼
Celotex	31½	24½	23
Same Pref.	20½	20¾	20¾
Certain-Teed Prod.	20⅞	17	15
Champion P&F Co.	25½	*23-24	..
Same Pref.	101	110	110
Container Corp. ..	47½	42¾	38½
Cont. Diamond....	10	8¾	18
Crown Zellerbach.	32⅞	27⅞	29¾
Same Pref.	105¼	*105-105½	108
Same $4 Pref....	122½	*116-122	119¾
Dixie Vortex	31¾	*29-29¾	49½
Same "A"	51½	54	54½
Robert Gair Co. ..	7¼	8¼	9½
Same Pref.	21	20	19¼
Gaylord Container.	18½	15	..
Same Pref.	107	*91-100	79
Intl. Paper	53½	46	48¼
Same Pref.	105	105	..
Kimberly-Clark ..	23¼	22½	..
McAndrews & Forbes	36¾	*35½-37	39
Masonite	63	50½	58
Mead Corp.	20½	21	22
Same Pref.	103½	103	..
Same 2nd Pref..	48	47¾	..
National Cont. ..	37¼	28½	28½
Paraffine Cos. ...	77½	*64½-66	69
Same Pref.	106¼	*107-110	109½
Rayonier, Inc.	25⅛	17⅞	22½
Same Pref.	36⅛	34⅛	38
Scott Paper	47½	47	57
Same Pref.	100¼	102	..
Sutherland Paper.	46¼	*42½-43½	40
U. S. Gypsum.....	105¾	110	114
Same Pref.	188	*187½-194½	195
United Wall Paper	9¾	7½	..
Same Pref.	46	*41½-45	..
W. Va. P&P Co...	39¾	34½	38½
Same Pref.	112	*110-114	113

New York Stock Exchange—Bonds

Celotex 3½% 103¾	101⅝	..
Champion P&F Co.103½	103⅛	101⅞

New York Curb Exchange—Stocks

Am. Writing	0	8	10⅛
Great Northern...	44	40¼	42⅞
Hummel Ross	26⅜	18⅝	12¾
St. Regis	10	9⅛	10¾
Taggart	8½	6⅞	10

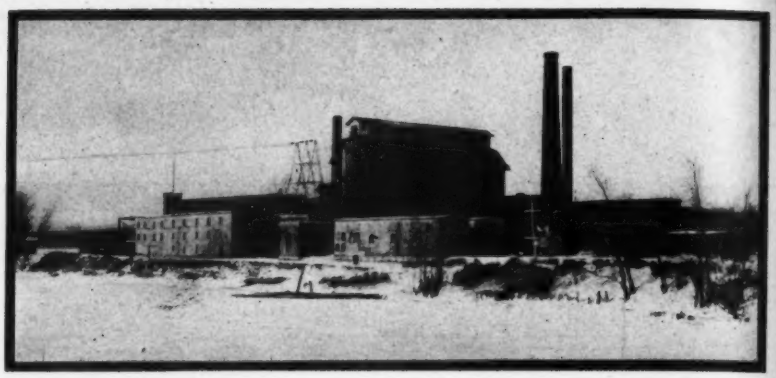
*Closing Bid and Asked Prices.

◆

MOUNT TOM SULPHITE MILL SOLD TO SAN-NAP-PAK CO.

Negotiations for the sale of Mount Tom Sulphite Pulp Company, Mount Tom Junction, Massachsetts, were completed at a recent meeting of the board of directors. The purchaser, San-Nap-Pak Manufacturing Company, Inc., New York, will take possession of the plant on February 1, according to announcement by Arthur N. Showalter, vice president and general manager.

San-Nap-Pak company plans the erection of new buildings and will install papermaking machinery including three paper machines. This will make the Mount Tom mill an integrated mill.



Mount Tom Sulphite Pulp Company plant which has operated continuously for 65 years. It has just been sold to San-Nap-Pak Manufacturing Co., Inc.

Mr. Showalter will remain in charge; the present staff and personnel will be retained, and a number of additional employees will be required.

The Mount Tom company, one of the pioneers in the chemical wood pulp industry, has been in continuous operation for 65 years. Its production of 50 tons daily has been devoted to the high grade specialty field, including pulp for glassine, soft absorbent tissue, technical tissue, and rayon grades of bleached sulphite. During the past six months, production has been stepped up to 55 tons a day, and it is planned to increase the pulp production to 60 tons.

The three new paper machines will take about 25 tons of the mill's pulp output per day; the balance will be taken by paper mills operated by San-Nap-Pak at Wheelwright, Massachusetts, and Rockland, Delaware.

◆

KIMBERLY-CLARK REPORTS ON YEAR'S OPERATIONS OF ITS THREE NEW PLANTS

The first full calendar year of operation of the Kapaskasing, Canada, mill of the Kimberly-Clark Corporation has been reported. During this year of operation which officially ends January 31, the mill has produced crepe wadding in an amount equivalent to 40,000,000 boxes of Kleenex. The production record is enhanced by the safety record established at the mill. Since February 1, last year, no time has been lost due to accidents.

Another new plant in the expanding operation of K-C is the Memphis, Tennessee, mill which is now in production. The Memphis mill is managed by Charles Eubank, who was formerly in the industrial relations office at the Neenah (Wis.) plant. The plant has received an award, a certificate of merit, from the city-beautiful commission of Memphis.

An entire community is growing out of the wilderness where Kimberly-Clark is building the LongLac plant. Permanent housing facilities are developing, and advantage is being made of natural surroundings. A recreation hall was completed recently in which the community enjoys religious activities and recreational pleasures.

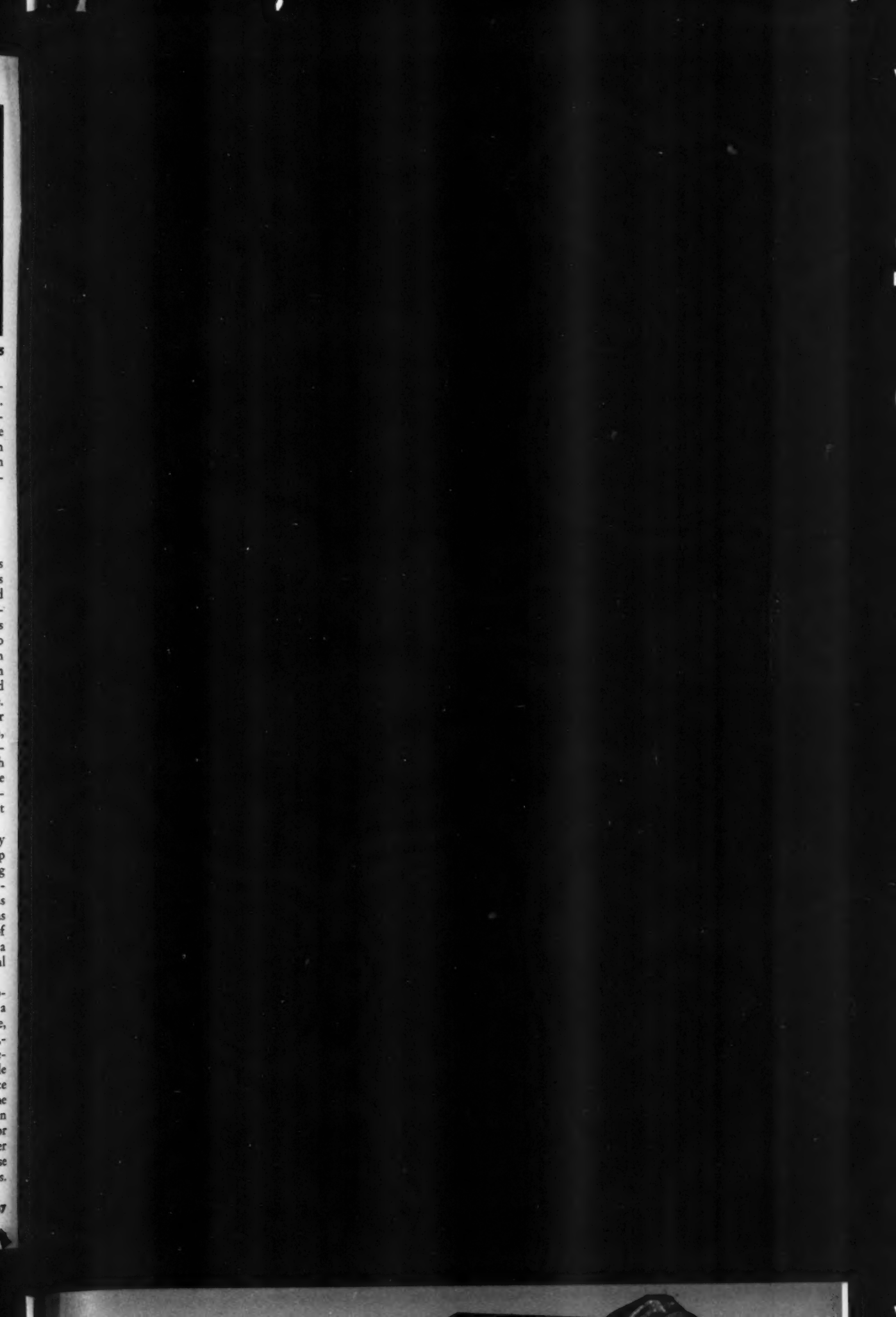
◆

ITALIAN PAPER NOTES (November, 1946)

▶▶▶ The struggle to secure imports of paper pulp and cellulose continues in Italy. Moreover, the paper and paperboard mills can only meet a limited portion of the nations demands for these goods, and it is necessary to employ many more mill hands than would be ordinarily required for such scarce production which is maintained much below the capacity of the mills. In an effort to alleviate the paper scarcity caused by small production, arrangements are being made to establish a marketing system under which payment for paper imports could be made by fifty per cent export of Italian goods and the balance by payment in stable currency.

Although the Italian paper industry has made every possible effort to keep imports at a minimum by bolstering its production facilities, home production of paper and paper products has not reached a satisfactory level; it has become necessary for the Ministry of Industry and Commerce to instigate a planned import schedule for the fiscal year, 1946-47.

The studies leading to the development of the import plan forecast a need for 127,000 tons of cellulose, 130,000 tons of wood pulp, and 175,000 tons of coal. If these requirements were met, it would be possible for the Italian papermakers to produce 250,000 tons of their products. The studies called for an allocation of an estimated 50,000 tons of wood for the production of cellulose. A further breakdown limits the total cellulose produced from straw to 12,000 tons.



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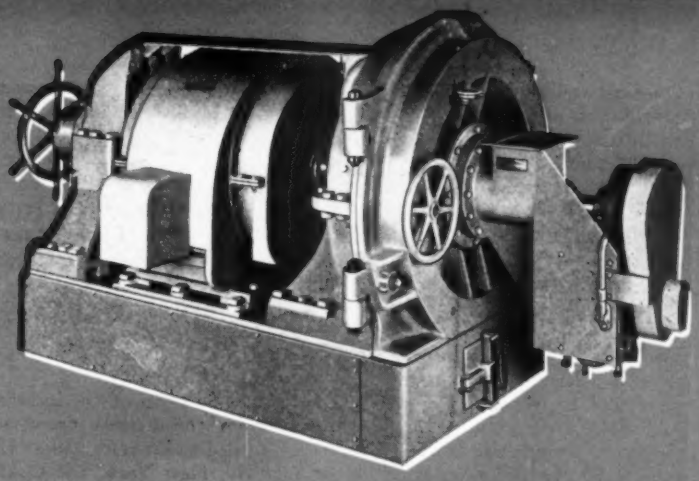

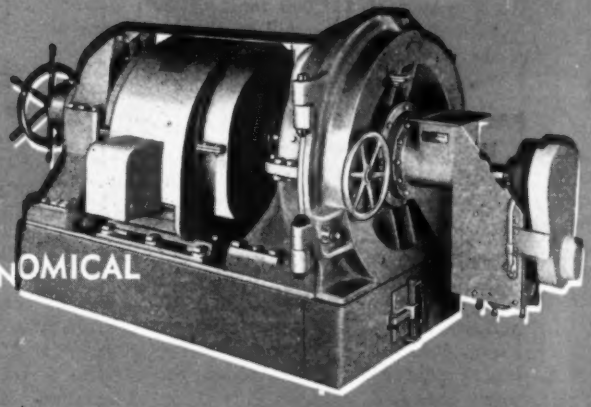

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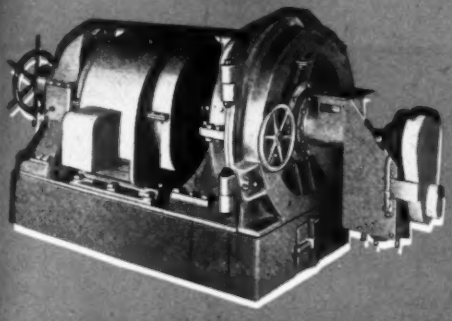

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Get Sprout-Waldron's advice. Our engineering know-how gained through years of experience with the pulp and paper industry can help you.

Over all, cellulose produced in Italy would not exceed 32,000 tons, and wood pulp production would not pass 80,000 tons.

The Ministry studies estimate that Italy needs 95,000 tons of cellulose and 50,000 tons of wood pulp under its import schedule in order to meet its industrial requirements. At the present time, commercial accords with other nations promise imports much under the Italian needs; and, therefore, it is hoped that additional import trade can be stimulated.

Should the import of cellulose and wood pulp approach the amounts required by the Italian industry, a decided reduction in the price of finished paper would result. In order to reach an equitable solution, it has been suggested that the paper industry support its own requirements by managing the exportation of manufactured paper which would of necessity be paid for in stable currency (dollars and pounds sterling). To assist in stimulating a free flow of export and import trade the government has instructed its customs offices to admit certain paper products directly when payment has been in stable currency.

Among the goods to be passed by customs of Italian manufacture are: paper of all types (excluding newsprint), all products of the graphic arts, printing paper, writing paper, paperboard, paper and paperboard tubes, paper shoe lasts, cardboard bobbins for the spinning and weaving industries, uncut paper and paperboard, perforated or otherwise specialized paper, boxes and other packaging material which are uncolored and unpolished, printed cardboard articles, playing cards, postcards, advertising posters, labels, loose sheets of undecorated paper, maps, journals, books, sheet music, registers, and manuscripts.

◆

NATIONAL CONTAINER EXPANDS FLORIDA PLANT—$1,225,000

Florida's National Container Corporation threw out its chest and stretched its arms November 15, in a $1,225,000 expansion program. Installation of new equipment and addition to facilities is under way at the Jacksonville plant which will increase capacity output from 90,000 tons of finished kraft board a year to a record 120,000 tons. This latest move doubles the original output capacity which was 60,000 tons in 1937.

Installation of a 300-foot lime kiln is nearing completion. Other installations include a digester vacuum evaporator, washing systems, refiners, a barking drum, paper machine dryers, and a 5,000 kilowatt turbogenerator.

R. H. Laftman, vice president and general manager of the company informed the industry that the expansion project was made necessary by increasing demand for containers and other paperboard products. He explained, "Consumption per capita has increased at an amazing rate," and pointed out that the rising trend is a normal result rather than the effect of a large wartime backlog. It was impossible for production facilities to meet the increased demand due to wartime shortages.

Conversion of the increased output from the Florida operation will be made in that state and at Long Island City, New York, and Oakland, California. The Container corporation's plants producing kraft board have a yearly output of 215,000 tons. The Jacksonville production will equal half of the present total.

◆

PACIFIC MILLS, LTD., UNDERTAKES EXPANSION—PURCHASES LOGGING COS.

J. R. Morgan, Limited, Queen Charlotte Island (B. C.), logging company and its subsidiary, Badwater Towing Company, Limited, have been purchased by Pacific Mills, Limited. The purchase price is reported to be over $1,000,000. Through terms of the sale, Pacific Mills also acquired the steam tug, *J. R. Morgan*.

The logging firm, founded in 1916 by J. R. Morgan, has been operated during recent years by Elmer J. Palmer, who is managing director of the company. Mrs. Marion L. Morgan was president of the organization, and C. C. Germyn, superintendent of the company.

Under its new ownership the name of the logging company will be changed to Northern Pulpwood, Limited. It is designated as a subsidiary of Pacific Mills, and will own and operate all logging facilities belonging to the parent company. The Morgan camps cut spruce, cedar, and hemlock; production in 1945 was 30-million feet.

Officers of Northern Pulpwood, Limited, will be Paul E. Cooper, who is also president of Pacific Mills, T. B. Jackson, vice president and general manager, J. A. Young, vice president and treasurer, G. J. C. Hodson, assistant treasurer, and J. H. Lawson, secretary.

◆

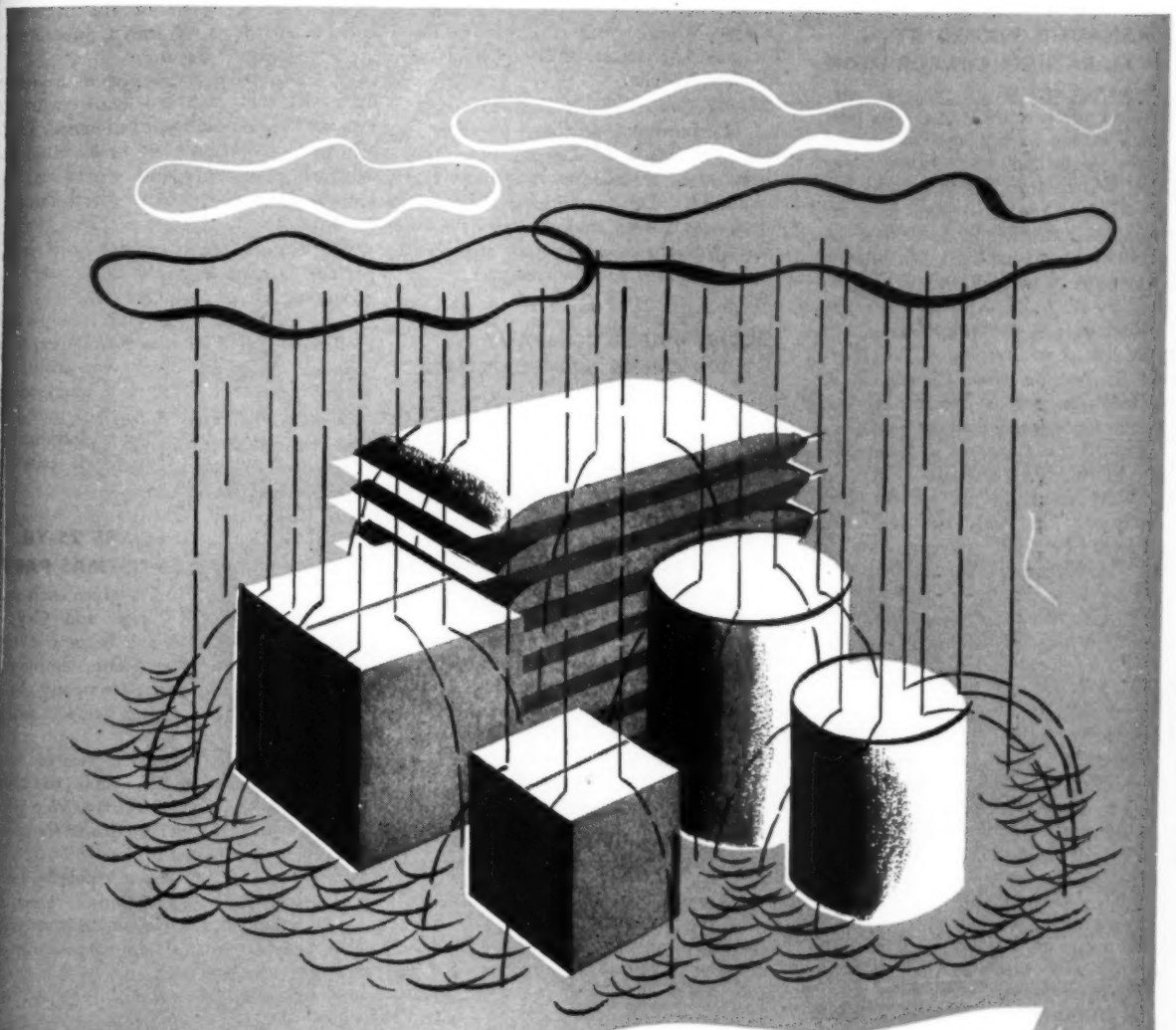
CRYSTAL TISSUE GIVES 25-YR. AWARDS AT CHRISTMAS PARTY

The Christmas Party given each year for the Crystal Tissue and Crystal Waxing employees has become a tradition. On this occasion, employees of The Crystal Tissue Company, Middletown, Ohio, with a service record of twenty-five years are presented with watches. Service awards were given this past Christmas to seven men. L. J. Long, executive vice president of the company, made the presentation.

Approximately 600 people, employees and their families, attended the Christmas Party which was given in the Amanda School Auditorium on December 16.

Recipients of 25-year service watches at the Crystal Tissue Company's annual Christmas party. Left to right: Carroll Fleming, John Walck, Thomas Clark, Chris Strohman, Lylburn Fleming, E. E. Grant, and L. J. Long. Robert Noe, who received one of the watches, was absent from the party

industry can help you.



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SIX REGIONAL SALES MANAGERS NAMED BY MARATHON CORPORATION

Appointment of six regional sales managers and seven sectional sales promotion managers has been announced by the Marathon Corporation, Menasha, Wisconsin. The field sales organization is to be divided into six geographical units, and each is to be headed by a regional sales manager.

Activities in the East will be directed by R. A. Nash, who will make his headquarters in New York City; in the east central region, E. H. Morgan will operate from Cleveland; in the southern region, Walter Evans, Atlanta, Georgia; in the central region, W. Roy Welch, Chicago; in the southwest, Harold Pierce, Kansas City; in the West coast, H. W. Hicks, San Francisco. The field sales staff will be directed by A. W. Stompe, who has been named general sales manager.

At the same time as the regional sales reorganization was made, seven sales promotion men were named to operate from the home office and to direct promotional activities in various lines. The assignments made included: Fred Deutsch, frozen food packaging; Walter Dixon, dairy packaging; B. T. Hoffmaster, jobber specialty products; E. V. Krueger, meat and vegetable oil packaging; Ted R. Neely, specialty packaging; Roy Rhyner, jobber resale products; and John Snyder, bakery packaging. All appointments will become effective in February, 1947.

◆

BENJ. C. BETNER COMPANY ORGANIZED IN WISCONSIN

Formation of the Benj. C. Betner Company of Wisconsin, was effected in Appleton on December 9. The newly organized company will produce and merchandise specialty bags and laminated papers used in the food industry. Announcement of the organization of the company was made by R. H. Purdy of the Tuttle Press Company and Benjamin C. Betner, Jr., of the company bearing his name, Devon, Pennsylvania.

Operation of the new company will be centered in the Tuttle Press Company plant in Appleton, and will, in fact, be an expansion of the Tuttle Press' products and a utilization of new equipment. The combination of the two organizations will not effect any change in the manufacture of Tuttle's already existing lines. The merger of the companies is in line with the Betner policy of extending its services to strategic sections of the country.

Distribution and sales of the products manufactured in Appleton will be directed by the Betner sales organization which maintains offices in Richmond, Virginia, Oklahoma City, and Los Angeles.

Officers of the new company are: R. H. Purdy, Appleton, president; Henry W. Stevens, Devon, Pennsylvania, vice president; Benjamin C. Betner, Jr., Devon, secretary; L. R. Watson, Appleton, treasurer; and William E. Buchanan, Appleton, assistant to the secretary and the treasurer.

◆

GILBERT PAPER COMPANY OPENS NEW CAFETERIA

Opening of the new employees cafeteria by the Gilbert Paper Company, Menasha, Wisconsin, has been announced. The lunch room is located on the ground floor of the new wing of the paper mill overlooking the Fox River. The cafeteria is completely air-conditioned; it is lighted by concealed ceiling lights, and is modern in every detail.

Before the holiday season meals were served only during the daytime, but beginning with the first of the New Year, the cafeteria was opened during the whole twenty-four hour operation of the plant.

◆

PAPER AND PULP MILL '46 EXPANSION REFLECTED IN RUST ENGINEERING REPORT

During 1946, The Rust Engineering Company of Pittsburgh and Birmingham (Ala.) completed design and construction of industrial plants and facilities valued at more than $50,000,000, as well as assuming contract awards for two hundred and fifty new projects. The paper industry is in pace with the current trend toward greater expansion as reflected in the Rust report.

Work in seven states was undertaken by the Rust Engineering Company to expand the nation's papermaking capacity. At Covington, Virginia, the West Virginia Pulp and Paper Company's mill was expanded; design and construction of the sulphate mill and new facilities of the Brown Company's Berlin, New Hampshire, works was engineered by Rust; a new fiberboard plant at Macon, Georgia, built for the Armstrong Cork Company, which has a capacity of 500,000 square feet, was built by Rust; the $5,000,000 expansion for Celotex Corporation's bagasse mill at Marrero, Louisiana, was carried out by Rust; and the new $5,000,000 kraft board mill at Fernandina, Florida, was among the projects Rust engineered.

Rust completed the $2,000,000 expansion for the Union Bag & Paper Company at Savannah, Georgia. This mill ranks among the largest producing paper and board, multi-walled bags, retail store bags, and specialty bags. By the year's end construction was well advanced on the American Viscose Corporation's Meadville, Pennsylvania, plant expansion which will increase by 50 per cent its production capacity.

Work is also being handled by Rust for the Crossett Paper Mills, Crossett, Arkansas, the Camp Manufacturing Company, Franklin, Virginia, and the Hollingsworth & Whitney Company's Mobile, Alabama, and Waterford, Maine, plants.

Among the other industrial operations expanded during the year, Rust engineered and constructed plants for the Diamond Alkali Company in Chicago (see Allied); the United States Sugar Company, Clewiston, Florida; the Bethlehem Steel Company, Sparrow's Point, Maryland; Roebling's Sons Company, Roebling, New Jersey; and the Chesapeake & Ohio Railway, Huntington, West Virginia.

◆

U. S. GYPSUM EXPANSION PROGRAM TOPS 42 MILLION

The vast expansion program being carried out by the United States Gypsum Company provides for construction of new plants and expansion and enlargement of existing properties to the extent of $42,000,000. Announcement of the project came with the registration of 399,477 shares of $20 par common stock with the Securities and Exchange Commission.

Offering the stock to present shareholders on the basis of one share for each three shares currently held at a price of $60 per share is expected to raise $23,968,620 to be applied in financing the expansion movement. Shareholders of record at the close of business on January 4 were given the privilege of purchasing the new issue and eligibility extends until January 31. No provision has been made in the registration statement to the SEC covering the sale of the new stock issue to buyers other than existing stockholders.

In addition to the five plants now under construction, the major features of the expansion program provide for the building of a new insulation and hardboard plant at Alta Vista, Virginia, and the construction of new plants for the production of insulating wool and acoustical products, as well as facilities for the production of asbestos and asphalt roofing material. Provisions of the plan also call for the purchase of two new cargo ships to replace those lost dur-

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Mill Superintendents find this service invaluable in suiting the particular requirements of their mill—even down to each machine position if desired.

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HOOPERWOOD DRYER FELTS

COTTON AND ASBESTOS

ing the war which will carry raw gypsum from Nova Scotia to Atlantic seaboard ports; as part of these provisions, construction of a new loading port at Bay of Fundy, Nova Scotia, will be undertaken.

Plants now under construction and included as part of the over-all U. S. Gypsum expansion movement are:

A large modern paper mill in Clark Township, New Jersey, for the production of paper used in the company's gypsum board production;

A new gypsum mill at Norfolk, Virginia;

A new gypsum plant in the Imperial Valley of California designed to double production of the company's gypsum products in that section of the country;

A paper mill at Los Angeles to provide paper for the West coast operations;

A gypsum plant at Sigurd, Utah, to add gypsum production facilities for the Northwest.

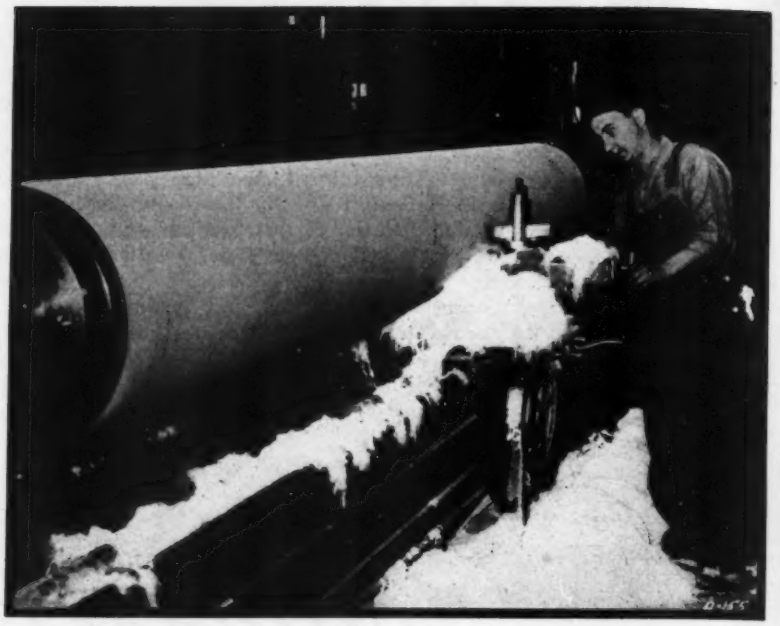
The construction program now under way represents approximately 50 per cent of the total $42,000,000 expansion.

◆

CEMENTED CARBIDE TOOLS USED TO MACHINE CALENDER ROLLS IN BRYANT PLANT

The Bryant Paper Company, Kalamazoo, Michigan, is resurfacing worn and burned-out calender rolls with tools tipped with Carboloy cemented carbide. This metal is said to be harder than the hardest steel. Diameters of the rolls at Bryant Paper Company range from 15 inches to 18 inches; length of rolls runs from 64 inches to 164 inches. The company has 13 stacks, each machine containing six calender rolls, giving a total of 78 rolls of various sizes to keep in condition. When in use in the calender stack, pressure on the cotton roll is 1500 pounds per inch along its entire length, giving as much as 246,000 pounds total pressure on the longest rolls.

Such pressure with its attendant friction causes burned-out spots to appear on the surface of the rolls. Some of these are as large as a man's hand and ½ inch deep. Inasmuch as the O.D. of calender rolls at Bryant must be held to .001 inch for concentricity, and the taper must be held so that the roll will match with the hardened steel roll opposite it in the calender stack, all such burned or "low" spots must be removed as soon as they form. This, of course, necessitates turning the entire length of the roll—some of them 14 ft. long—in a lathe.



Machining cotton calender rolls with cemented carbide tipped tools

High speed tools were first tried on this operation. They proved to be too slow to keep Bryant's 13 machines in continuous operation—due both to the low cutting speeds necessary and the frequent resharpenings required.

Tools tipped with Carboloy Grade 883, a product of Carboloy Company, Inc., Detroit, have a cutting speed on present equipment at Bryant of 180 sfpm with a feed of .015 in. to .020 in. per revolution. It is reported that speed is limited only by present equipment, since the carbide tools themselves cut much faster without softening or dulling.

◆

REPORTS ARE THAT GENERAL TARIFF LAW REVISION MAY BE EFFECTED THIS YEAR

There are reports at Washington according to a report issued by Warren B. Bullock, manager of the Import Committee of the American Paper Industry, that Administration officials plan to seek a general revision of the Tariff laws during 1947, even though there will be a Republican Congress at that time. The Trade agreement negotiations are expected to develop such over-all problems that a complete tariff law revision may eventually be necessary.

Plans have been announced for the hearings to be conducted in Washington on the pending proposals for tariff reductions under the Administration's Reciprocal Trade Agreement program. Beginning January 13, three days are scheduled for hearings by the full Committee for Reciprocity Information, when government officials, congressmen, governors and organizations addressing themselves to general provisions of the proposed agreements will be heard. However, it is hinted that these hearings will be limited to three days. Industries and individuals appearing in relation to specific commodities will then be heard by one of five subcommittees. These subcommittees are expected to be divided as follows: textiles, metals, agricultural products, chemicals and miscellaneous. From this schedule it would appear that paper, one of the nation's most important commodities, will be classified in the "miscellaneous" group. Each subcommittee will be headed by a member of the Committee for Reciprocity Information. Commodity experts familiar with the products under consideration will not be members of these committees, the other members being government officials who may or may not have any knowledge of the commodities on which testimony is to be taken.

It has also been announced that the tariff conference of eighteen nations to adjust tariff rates will meet in London April 8. In previous negotiations the conferences have been held between representatives of two nations. At the London conference, however, it is planned to have representatives of all eighteen nations negotiate tariff reductions in round-table discussions.

BRIEFS

▶▶▶ RETIREMENT PLANS offered by the Kimberly-Clark Corporation were discussed by the company's vice president, Ernst Mahler, at the annual pensioners dinner held at the club-house in Kimberly, Wisconsin, recently. Mr. Mahler told the gathering that a retirement fund of $3,500,000 had been established by the company for those reaching retirement age, and pointed out that in 1947 there will be more than 200 K-C pensioners. Of this number, the Kimberly mill has retired 70.

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▶▶▶ SUBSIDIARY OF the Southern Paperboard Corporation, the Gair Woodland Corporation, plans to set out a million seedling pine trees on its holdings in Georgia, South Carolina, and Florida, during the winter months.

◆

▶▶▶ ACQUISITION OF THE National Folding Box Company (a newly formed New Jersey Corporation) by the National Folding Box Company, Incorporated (a Connecticut corporation) has been effected. George W. Mabee, president of the Connecticut firm has retired, and he has been succeeded by Walton D. Lynch. The merger of the two companies increases the capitalization of the organization from three million to five million dollars.

◆

▶▶▶ RECORD PRICE BIDS have been made by the Everett Pulp and Paper Company at Portland, Oregon, for Pacific Northwest Timber. The bid submitted by the Everett company was the highest among eleven entered, and the company has obtained a logging contract in the Snoqualmie National Forest at a price of $226,658.10 for the right to log 14,570,000 feet of timber.

◆

▶▶▶ APPROVAL HAS BEEN granted by CPA to the Western Waxed Paper Company (Portland, Ore.) to begin construction of a $74,000 office building.

◆

▶▶▶ THE QUARTERLY dividend rate on its common stock was raised to 75 cents a share by the board of directors of International Paper Company on November 26. The board also declared an additional year-end dividend of 75 cents a share. During

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1946 a total of $3.00 a share has been declared for payment on the company's common stock, and this recent action raises the current quarterly dividend to a $3.00 annual rate. The board also declared a $1.00 dividend on the cumulative $4.00 preferred stock.

◆

▶▶▶ CONTROL OF THE Ryegate Paper Company (Ryegate, Vt.) has been purchased by interests connected with the Perkins-Goodwin Paper Company, New York City. Under the new ownership officers of the Ryegate firm will be: Thomas B. Farwell, president; Roy E. Farwell, vice president; and T. E. Kloss, general manager and superintendent.

◆

▶▶▶ FRENCH INDUSTRIALIST, L. Cornillat, has informed Premier Duplessis, of Quebec, that the pulp and paper mill at Chicoutimi, Canada, will be reopened. A group of Canadian and French capitalists headed by Mr. Cornillat will operate the new undertaking.

◆

▶▶▶ NEW YORK EMPLOYEES of the Riegel Paper Corporation and the Riegel Textile Corporation held their annual Christmas party on December 23, at the Park Lane Hotel. Gold watches, token of twenty-five years of faithful service, were awarded to those employees who had served that time with the Riegel organizations. Over two hundred officers and other Riegel employees now are members of the Twenty-Five Year Club.

◆

▶▶▶ IMPROVEMENT PLANS are contemplated by the Oxford Paper Company, Rumford, Maine. Production facilities of the mill will be bolstered at a cost of more than $10,000,000 and three to five years will be needed to complete the project.

◆

▶▶▶ MILL AND CARTON PLANT belonging to the Standard Carton Company, Tacoma, Washington, have been leased by the California Container Corporation, subsidiary of Container Corporation of America.

◆

A NEW MAINTENANCE center will be built at the Longview, Washington, plant of the Longview Fibre Company. CPA approved the project which will be built at an estimated cost of $87,000. The new center will eliminate a number of shops and small repair units which are scattered throughout the mill.

▶▶▶ ONE OF FIFTEEN FIRMS to receive the National Garden Institute plaques for the fourth consecutive season is the Brown Company, Berlin, New Hampshire. The company made available land for many of its employees and gave them assistance in the selection of garden produce to be raised on the plots. It is estimated that employees of the Brown Company have raised $34,720 worth of garden produce.

◆

▶▶▶ HOUSE ORGAN OF THE Crocker-McElwain Company (Holyoke, Mass.), *The Paper News Poster*, was awarded recognition for distinguished service in industrial journalism by the Associated Industries of Massachusetts and the Massachusetts Industrial Editors Association. The publication is edited by Edson S. Dunbar, sales promotion manager of Crocker-McElwain.

◆

▶▶▶ CPA APPROVAL HAS been granted to Fibreboard Products, Incorporated, Portland, Oregon, to construct a $563,521 factory to be located in Portland. The new plant will be used in the manufacture of folding and set-up containers for packing fresh fruit, vegetables, and frozen foodstuffs.

◆

▶▶▶ VALUABLE OIL PAINTINGS belonging to the Crane family of Dalton, Massachusetts, were destroyed in a fire which ravaged the Fred G. Crane estate. Among the paintings were portraits of the prominent papermaking family. Mr. Crane, who had just returned from a European visit, discovered the fire.

◆

▶▶▶ FAMOUS OLD PLANTATION located near Camden, South Carolina, and belonging to L. I. Guion which includes an estimated 9,000 acre area has been purchased by Edwin B. Boyle of Sumter, South Carolina, and the West Virginia Paper and Pulp Company of Charleston. The purchase price was placed at $150,000.

◆

▶▶▶ THE QUARTER CENTURY CLUB of the Thilmany Pulp and Paper Company has elected John Leddy, former vice president of the executive committee, president of the committee. Fred Goetzman has been elected vice president, Otto Trettin, second vice president, and William Voie, secretary. Twenty-one candidates for membership were initiated at a meeting held at the Kaukauna (Wisconsin) Elks Club recently.

This Beloit 166" Removable Fourdrinier is a good example of the extensive use of Timken Tapered Roller Bearings throughout the paper industry.

With all rolls turning on Timken Bearings the machine is in operation 24 hours a day. The table rolls mounted on the top rail are subject to a continuous vibrating motion, thus increasing the severity of the conditions which the bearings have to overcome.

Timken Roller Bearings have a long record of outstanding performance in fourdrinier service because of their ability to eliminate friction; to carry radial, thrust and combined loads; to hold the rolls in correct and constant alignment; and to permit of such efficient sealing that the bearings are thoroughly protected against dirt, moisture and other destructive conditions at all times.

To be sure of getting Timken Bearing performance in your paper mill equipment, look for the registered trade-mark "TIMKEN" on every bearing you buy. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TAPERED ROLLER BEARINGS

48 YEARS OF ENGINEERING AND METALLURGICAL DEVELOPMENT

Which Felt would YOU prefer?

Above is a picture of a well loaded, sluggish, napless felt that would do very little useful work on the machine. Below it is that *same* felt after treatment with a Magnus Felt Conditioner. You can see that it is clean, absorbent, full-napped, ready for high speed operation.

MAGNUS FELT CONDITIONERS

are supplied in a number of types to meet the felt cleaning and conditioning problems of all paper mill operations. There are types for conditioning felts on the machine or off . . . with the machine going or shut down . . . through the showers or for overhead tanks.

You can get better conditioned felts if you use the Magnus Cleaner best adapted to your operations.

Tell us the kind of paper you make and let us send a liberal trial sample of the Magnus Conditioner we recommend for a better cleaning job.

Magnus Paper Mill Cleaners

MAGNUS CHEMICAL COMPANY · **192 South Avenue, Garwood, N. J.**

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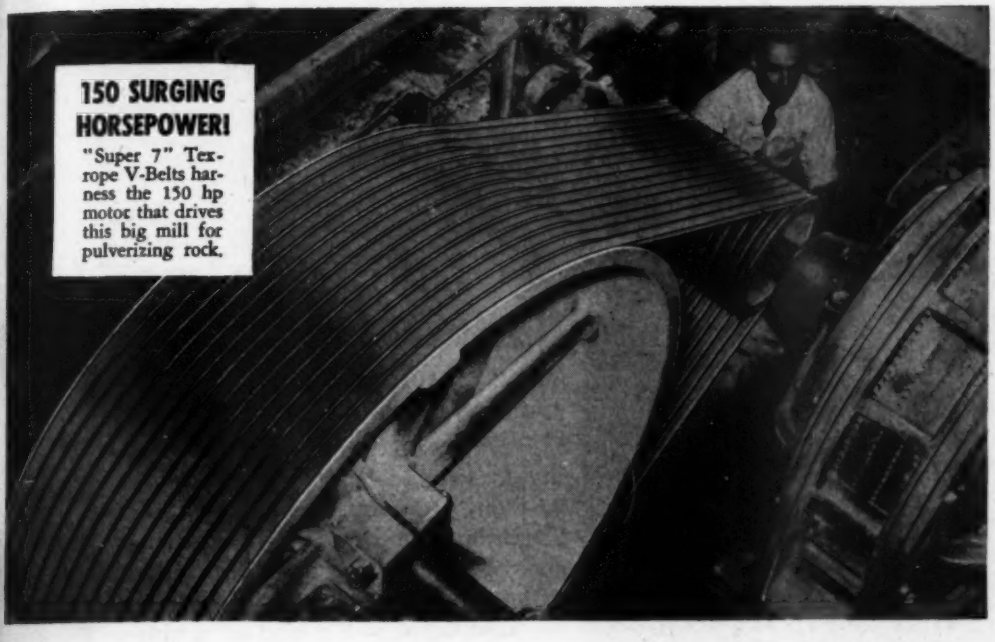
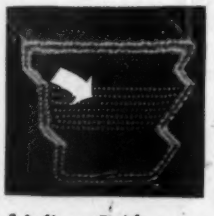
IN CANADA — MAGNUS CHEMICALS, LTD., 4040 RUE MASSON, MONTREAL 36, QUE.



PULLING POWER

. . . one of the 7 Great Features in "Super 7" Texrope V-Belts!



1. STRONGER CORDS give "Super 7" Texrope V-Belts their great pulling power. These long-fibre, hard-twisted cotton cords have the strength of high-test fish lines. Laid row on row and imbedded in heat resistant rubber compound, they provide a powerful load-carrying element.

2. TOUGHER COVER. Rugged duplex construction protects the carcass of "Super 7" belts from wear and dirt.

3. HEAT RESISTANCE. *All* "Super 7" V-Belts are designed and built to give high resistance to heat.

4. SHOCK ABSORBING. "Super 7" construction combines great strength with the degree of resiliency necessary for long belt life and smooth power transmission.

5. PRECISION CURED in pressure molds to assure accurate section and perfect bonding of cords, cover and cushion.

6. ACCURATELY MATCHED. Every belt weighed, measured and carefully inspected before being sized and packed.

7. ENGINEERING LEADERSHIP. "Super 7" Texrope V-Belts represent 27 years of research and experience — by Allis-Chalmers, originator of the Multiple V-Belt Drive.

• • •

There are FIVE types of "Super 7" Texrope V-Belts, to meet every operating requirement: *Standard — Heat Resisting — Oil Resisting — Oil Proof* — and *Static Resisting*. Call your Allis-Chalmers office or dealer. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

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TEXROPE .. Greatest Name in V-Belt Drives

"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.

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Speed variations up to 375% at the turn of a crank.

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Finest V-Belt engineering talent in the world—at your call.

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One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

For Every Type of Pulp . . .
For Every Type of Grinder . . .

There's a NORTON PULPSTONE

INDIVIDUALLY ENGINEERED to your operating conditions—that's the Norton Pulpstone.

The three types of Norton abrasives, the many grain sizes, the many degrees of hardness and the several structures make it possible to provide a pulpstone that is exactly right for *you*—taking into consideration the kind of grinders in your mill and their power input, the type of wood you are grinding and the quality of pulp you desire.

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Worcester 6, Massachusetts

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NORTON ABRASIVES

GUIDE TO LOW VALVE COSTS

● The plant that uses ESCO stainless steel U-bolt gate valves has low valve costs. If corrosive conditions are severe, the yearly cost of these valves frequently is only a small fraction of the cost of ordinary valves. There are good reasons for this economy—

ESCO STAINLESS STEEL U-BOLT GATE VALVES

- ✓ Resist Corrosion
- ✓ Moderate First Cost
- ✓ Lower Maintenance Costs
- ✓ Simple, Sturdy Construction
- ✓ Maintain Production by Reducing Shutdowns
- ✓ Long Life on the Job
- ✓ Quickly Disassembled for Cleaning

Available in both screwed and flanged types.

Where to Use ESCO U-Bolt Gate Valves

The answer is simple—wherever corrosion is present, location inaccessible and shutdowns costly. Install these valves where pressure loss is undesirable and minimum obstruction of flow is required.

Corrosion Study Free on Request

ESCO catalog 157 contains detailed information on the U-bolt gate valve and other stainless steel equipment for pulp and paper mills. This catalog also contains a study of corrosion resistance against the common acids, alkalines, gases and salts. Such information should be of great value to you and is yours for the asking. Use the coupon or write us.

ESCO STAINLESS STEEL FOR ULTIMATE ECONOMY

ESCO designs and builds special stainless steel valves for pulp mill service. Inquiries invited.

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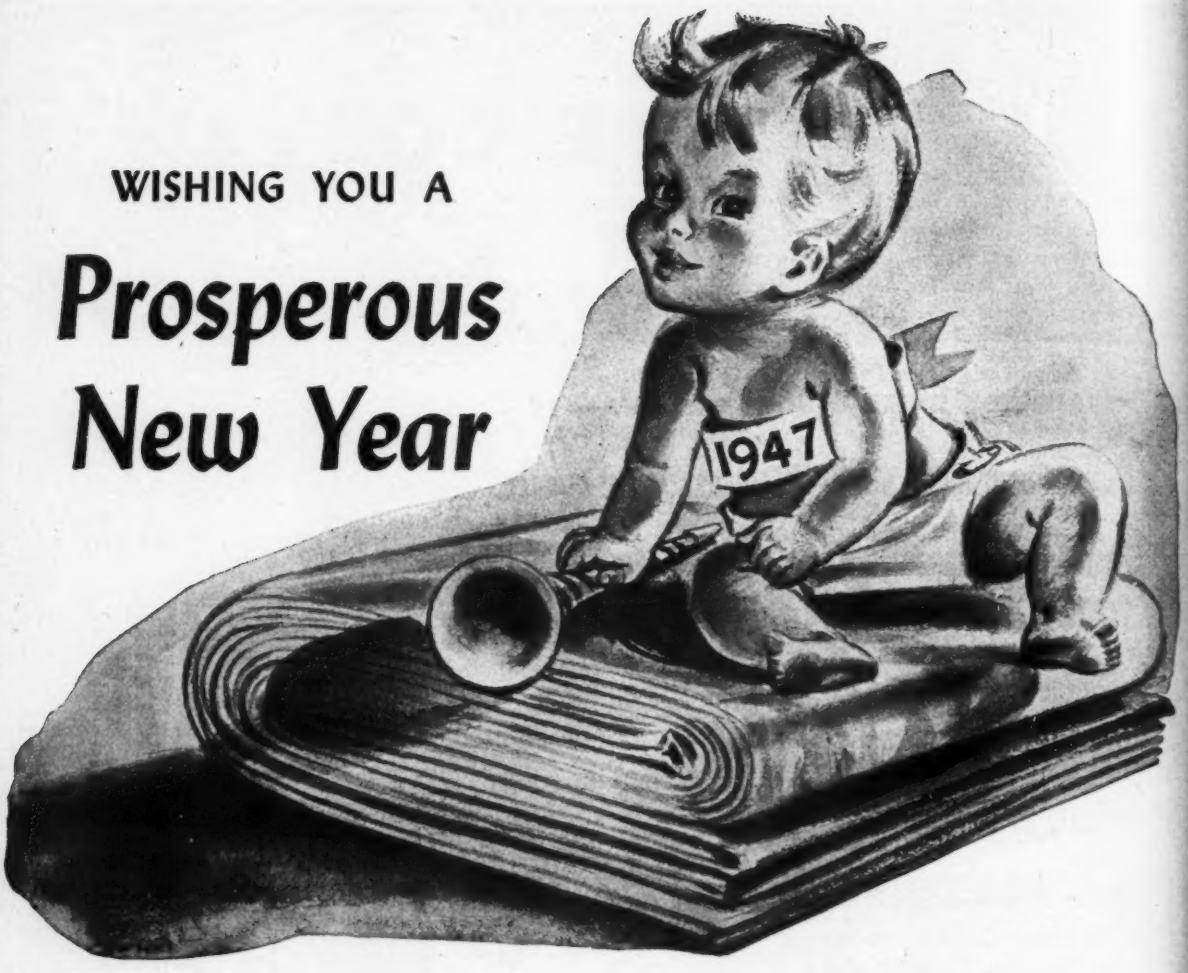
WISHING YOU A

Prosperous New Year



Notwithstanding shortages of materials, rising costs and all the tribulations that confront the manufacturers of paper and board, the men and women who make Hamilton Felts extend to those who use them cordial greetings and best wishes for a prosperous New Year.

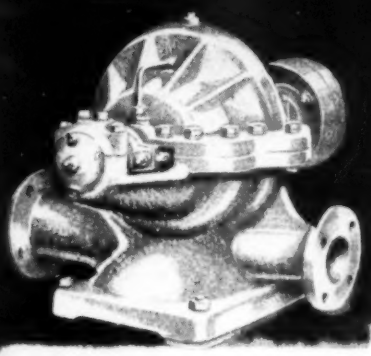
Hamilton Felts will contribute directly to the prosperity of the industry by increasing tonnage output, reducing fuel consumption and preventing needless unproductive time for your paper machines. In the year to come as in decades past there will always be Hamilton Felts that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

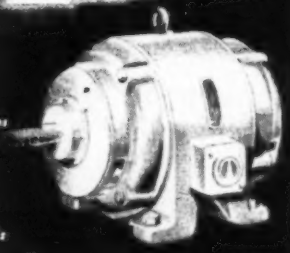
Hamilton Felts

• Established 1858 •



It's a family matter!

You can bring the widest variety of problems about fluids-moving to Fairbanks-Morse—*and keep them in the family!* Here's a single source—world-known and pump-wise—of proved pumping equipment, including the largest to the smallest centrifugals, vertical turbines and a broad line of special application types.



DON'T NOT place your pumping difficulties in the hands of recognized experts . . . men who have the broadest line, unlimited manufacturing facilities and a 114-year-old background of scientific research to offer you! See your Fairbanks-Morse agent or call our local branch office now.

SLEW MEMBER

A recent advantage in the line of electric motors designed and built by Fairbanks-Morse—for use on Fairbanks-Morse pumps. They cut your pump selection job in half—give you a pump manufacturer ready to take all the responsibility in selecting your pump and the power to operate it.

OUT IN THE WEST Fairbanks-Morse and Yuba deep well turbine pumps have long been a home in bringing water on to the land in mid-Section area . . . on farms, factories and wherever vertical turbines are used.

FAIRBANKS-MORSE

A name worth remembering

FIRE PROTECTION FIRE PUMPS ELECTRIC ENGINES GASOLINE MOTOR PUMPS
HAND PUMPS STOKERS ELECTRIC MOTOR CARS and TRACTORS YUBA PUMPS

IN WIND, RAIN, SNOW OR HAIL • YOUR FREIGHT GETS THERE BY UNION PACIFIC RAIL!

Facts Favor Your Future in the "Union Pacific West"*

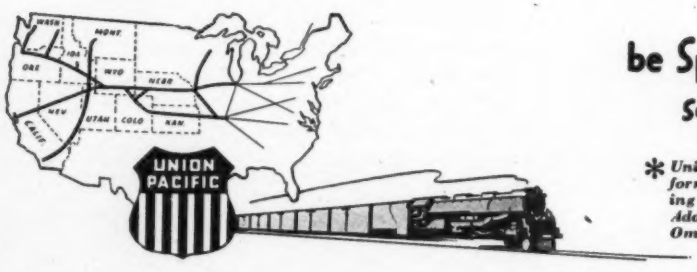
Of special interest to the Paper Industry

Fact 1. Since V-J day, hundreds of industrial and commercial concerns have located factories, warehouses and distribution facilities on the Union Pacific right-of-way in the western states served by the railroad.

Fact 2. This vast territory is rich in raw materials, natural resources, skilled and unskilled workers... with ideal living conditions, good schools, and plenty of space for future expansion.

Fact 3. Travel surveys show vacationists favor the western area by a wide margin. Result—greater interest in the West leading to permanent residence... growing markets, more manpower for industry.

Fact 4. Over its Strategic Middle Route, uniting the East with the West Coast, Union Pacific provides unexcelled rail transportation.



be Specific – say "Union Pacific"

* *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD

The Strategic Middle Route

New

ELECTRONIC RESISTANCE THERMOMETER

for Pulp and Paper

THE BAILEY PYROTRON

As a resistance thermometer the Pyrotron indicates, records and controls temperatures between-100°F and 1200°F. It simultaneously records as many as four temperatures on its 12-inch chart, or may record and control as many as two temperatures.

An independent continuously connected measuring circuit serves each recording unit. These circuits are kept in continuous balance by sturdy motion-free electronic detectors which do away with the delicate parts and "step by step" action of galvanometer type instruments.

Indicating, recording and controlling instruments are furnished in rectangular casings as illustrated. Indicating and controlling instruments are furnished in 12-inch round type casings.

CHOICE OF THREE CONTROLS

Bailey Pyrotrons are furnished with the following types of Automatic Control:

1. AIR OPERATED—Uses standard Bailey Pilot Valves, air relays, control valves and control drives. Operates by compressed air at 35 lb. pressure.

2. ELECTRONIC—Uses standard electronic control panel operated from a control bridge in the Bailey Pyrotron.

3. ELECTRIC CONTACTS—Uses micro switches on slidewire unit or electronic relay operated from control bridge in the Bailey Pyrotron.

P-5

UNUSUAL FEATURES OF THE BAILEY PYROTRON

Suitable for severe service where vibration and shock exist.

Measuring circuit operates from instrument power supply eliminating need for standard cell and dry battery.

Sturdy electronic system maintains continuous balance.

Motor drive furnishes abundant power to operate recorders, controllers and alarm switches.

Two recording controllers may be housed in one casing.

Electronic units may be interchanged without disturbing instrument calibration.

For details, request Bulletin 230-A "Bailey Pyrotron Electronic Resistance Thermometer".
Bailey Meter Company, 1058 Ivanhoe Road, Cleveland 10, Ohio.
In Canada—Bailey Meter Company Limited, Montreal.

BAILEY METER COMPANY

1058 IVANHOE ROAD • • • CLEVELAND 10, OHIO

Controls for Processing

TEMPERATURE	FLOW
PRESSURE	LEVEL
% OXYGEN	DENSITY
% COMBUSTIBLES	RATIO

Some Valuable Information about the Preparation of Calcium Hypochlorite

What pH will give your bleach liquor greatest stability? How can bleach liquor which has been allowed to drop below this optimum pH be restabilized? How can you maintain consistent results in the bleach plant?

The answers to these and other questions were found by Hooker's Technical Staff in a special study made during progressive chlorinations of various strength calcium hydroxide solutions. This study has been printed as Hooker Bulletin 234, "The Lime Chlorine System in the Preparation of Calcium Hypochlorite." It will prove an interesting and valuable addition to your files. A copy will be sent free when requested on your letterhead.

This is but one of the Hooker Bulletins published in the interests of better pulp and paper making. Nor is the help of the Hooker Technical Staff available only in printed bulletins. The men who make up our Technical Staff have been working with the pulp and paper makers for many years and will be glad to consult with you on your particular problems and share with you their experience in chemicals and paper making.

HOOKER ELECTROCHEMICAL COMPANY

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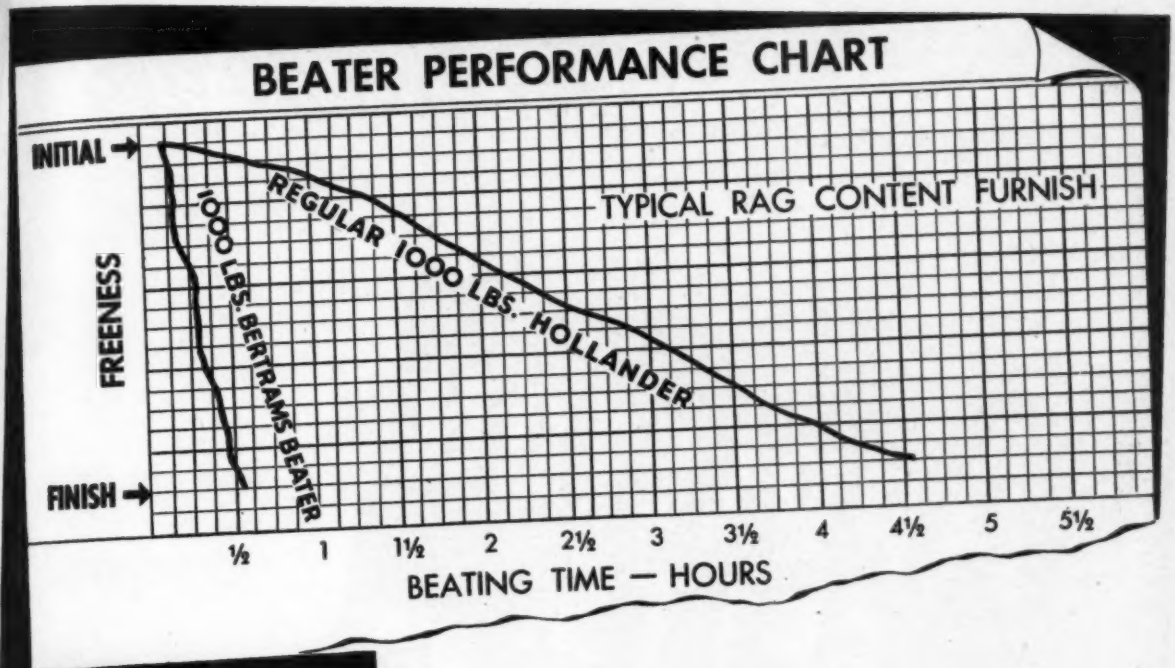
Caustic Soda Chlorine Muriatic Acid Sodium Sulfide



UNIFORM FIBRE TREATMENT

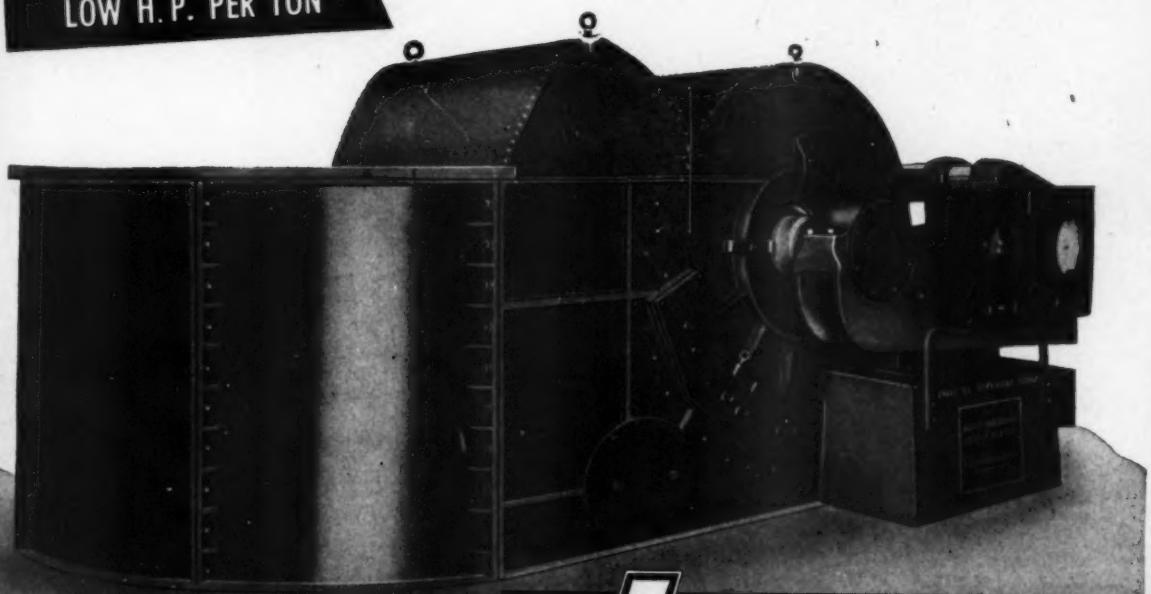
SHORT BEATING CYCLE

AUTOMATIC CONTROL

LOW H.P. PER TON

MORE AND BETTER WORK IN LESS TIME

While above chart is typical of rag furnish, comparable results are being obtained on all other grades of paper.



JONES-BERTRAMS PATENT BEATER

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.
Builders of Quality Machinery for Paper Mills

For Over 50 Years

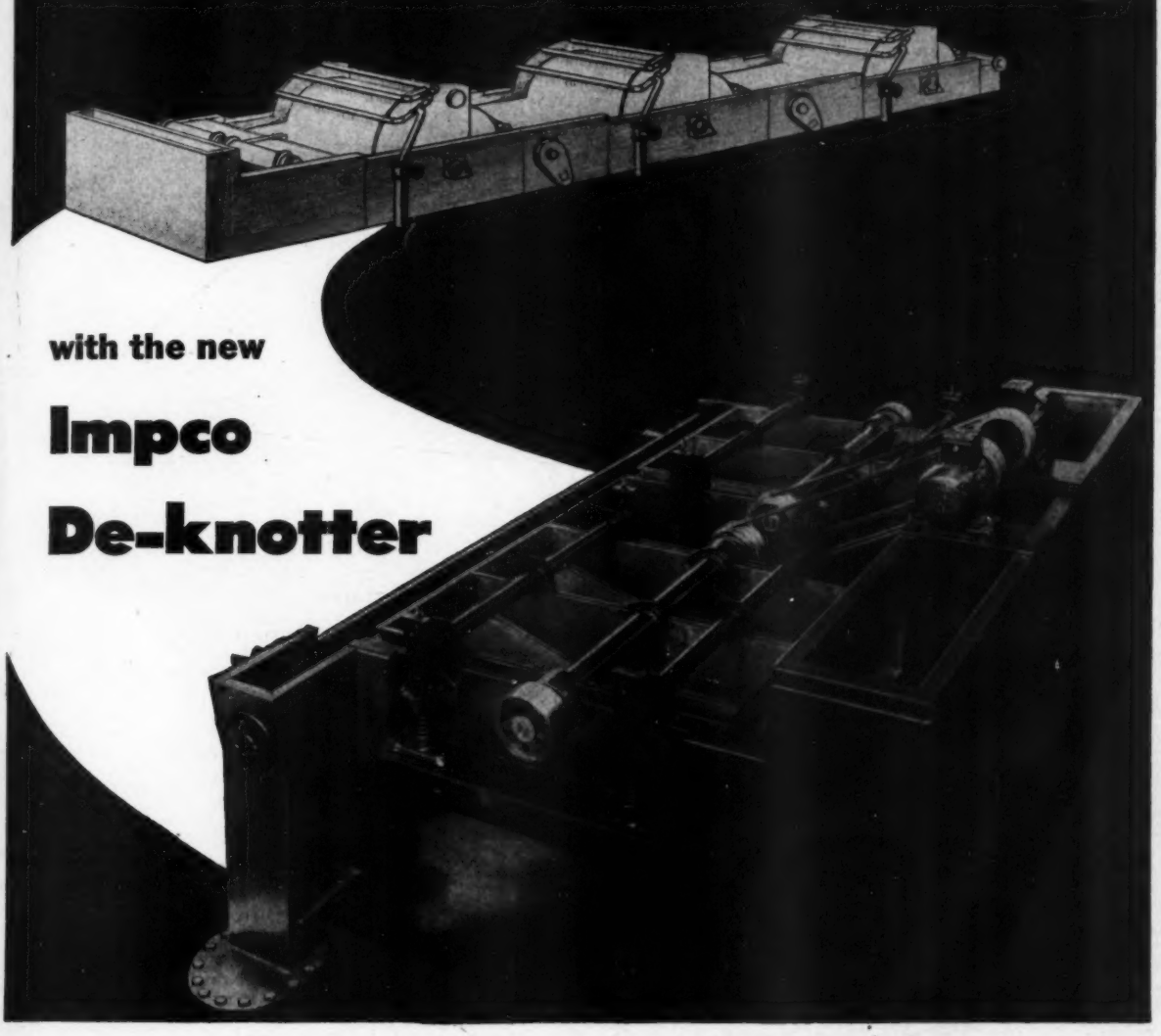
APPLETON FELTS

make good paper

Appleton Woolen Mills

APPLETON • WISCONSIN

Remove Knots Before Washing



with the new

Impco De-knotter

Gives better washing
Recovers knots with included soda
Reduces soda losses in pulp
Requires no elaborate piping and piers

Impco De-knotters

. . . are designed to mount directly ahead of the washers. *Not* separate units but complete with integrated vats including foam free inlets, baffles, motor mounts, knot collecting conveyors, and proper "slant" inlets for the primary washers.

Impco Counter-current Washers

. . . are designed to mount with the De-knotter in a rectangular slot in the operating floor, making an efficient, unified washing line. A full fledged complete washing system . . . strong liquor . . . closed system . . . cleanest pulp . . . requires least operating labor. *Write for the full story.*

Improved **PAPER MACHINERY CORPORATION**

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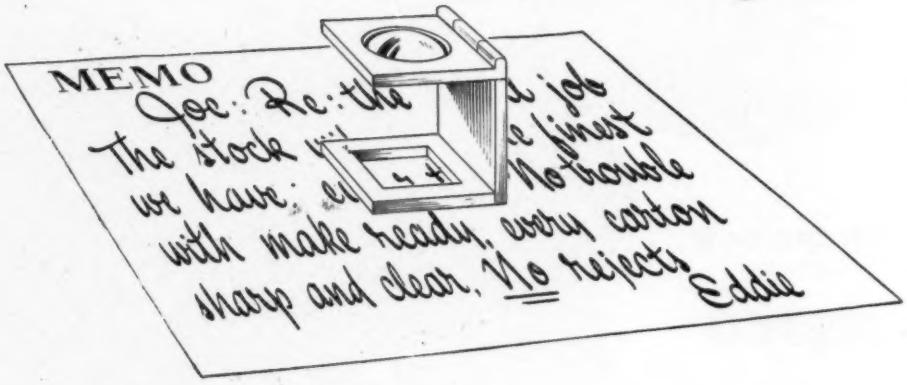
Is *Your* "top" TOPS ?



A perfect "top" on paperboard is easy—when you use Kelgin. This standout algin sizing agent produces a smooth, dense surface . . . insures even penetration of printing inks, oils and waxes. Result—brighter colors, needle-sharp printing.

Kelgin is easy to handle—soluble in either hot or cold water. It prevents sheets from curling, so there's no need to treat both sides. Kelgin won't cause picking, foaming or sticking to the rolls. A highly refined product of nature, Kelgin gives uniformly superior results at a surprisingly economical price. For suggestions on your sizing problems, consult our technical department.

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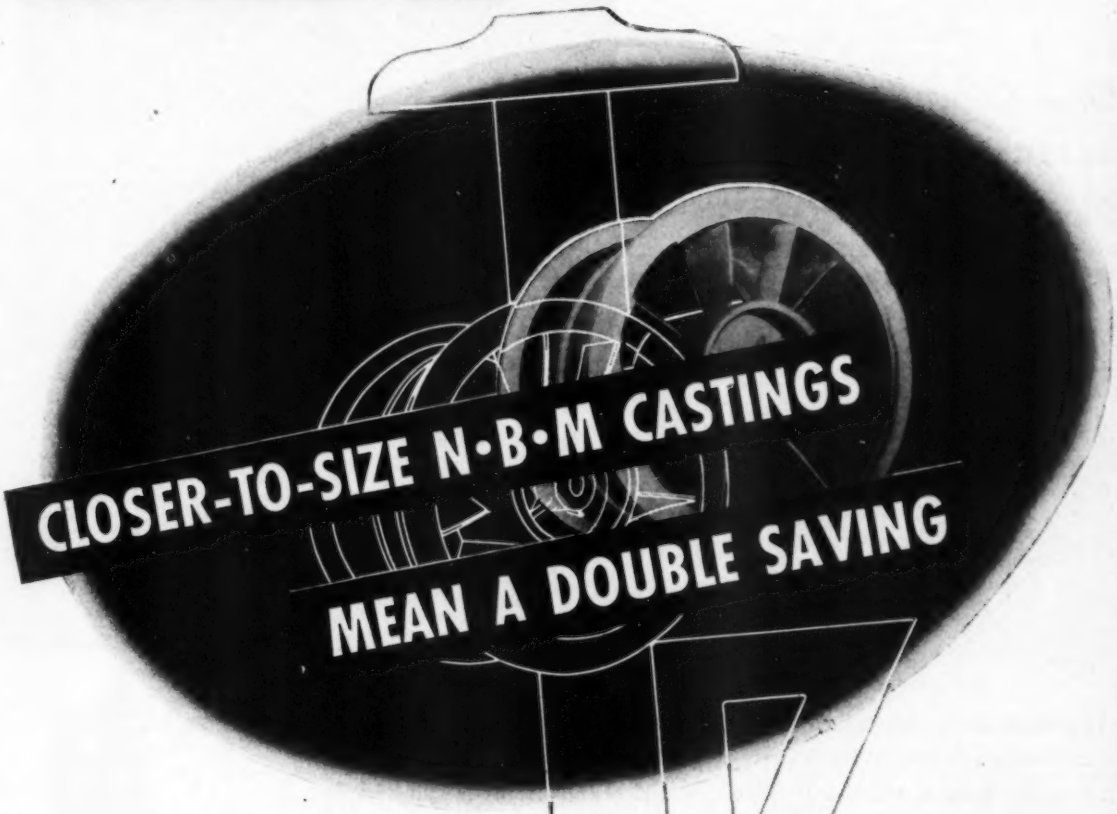
BETTER BRONZE PARTS



Our molding and pouring techniques produce "thin-skinned" castings with good solid metal immediately below the surface. *Result:* we can cast so close-to-size that you save up to 30% in weight plus proportionate savings in expensive machining time.

Whether you buy N-B-M castings in the rough or machined you save substantially.

N·B·M BRONZE CASTINGS
We put more service into them— you get more service out of them

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The free 200-page book of B&A products is an excellent guide to the range of high-purity chemicals available from your regional B&A warehouse. It contains pertinent data on 1,000 products. If you have not yet received a copy, request one today on business letterhead.

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* Complete stocks carried here.

EDITORIAL

Nineteen Forty-six Was a Miracle Year

▶▶▶ WE USE THE ADJECTIVE "miracle" to define that year as the one in which so many things came to pass which so many said could not happen. But, they *did* happen.

For instance, before the war so many people said regimentation and dictatorial political administration couldn't happen here—to the rest of the world "yes," but to us "never." But, it *did* happen to us.

Then, during the war and following V-J Day, they said we would never get rid of OPA and political regimentation of industry. But today, we have liquidated OPA; industry is pretty well back on the free enterprise basis; and at twelve o'clock, noon, on December 31, the President proclaimed that World War II was ended, thus automatically ending the wartime executive authority. Following V-J Day, predictions were widely heralded that wartime volume of employment and volume production would collapse. But there has been no such catastrophe.

Instead, employment held up to wartime basis and, in spite of production interruptions on a greater scale than ever before recorded in this country, the volume of production remained high and the dollar volume was as great as at the peak of the war.

This country underwent a loud and deep revolution during 1946. A nationwide revolt took place in protest against the obstruction imposed by racketeering union labor leaders who countenanced the breaking of labor contracts by strikes designed to cripple production and prevent the postwar industrial recovery. This revolution culminated at the election on November 5. What our burly bureaucrats, lurid fellow travelers and lovers-of-every-other-country-than-their-own failed to understand was that the people of this country believe in winning their domestic battle by ballots instead of bullets.

It's all over now. We are on the way back to maintain the pre-eminent position of this nation in the galaxy of world power.

For the miracle of all miracles is this—that out of the world's population totaling 2,170,000,000 persons, a nation inhabitated by 145,000,000 people emerges as one of the most progressive, most prosperous, most powerful and most civilized countries in the whole world. Why? What is the reason thereof?

The Soviets are diligently seeking the answers to those questions. This country is right now honeycombed with Russian commissions sent here to find those answers and transmit them, pronto, to the Kremlin. They will find our pre-eminence is based upon generations of Christian education, development of scientific knowledge, provident adaptation of the "know how" to *all* production processes, and an unconquerable conversion to the literal observance of all those laws which underwrite the liberties of mankind.

When the knowledge of these facts percolate their minds, and they realize the futility of even trying to change the course of this nation's destiny by subversive tactics, they will get in line and co-operate for their own salvation and for the reconstruction of the world.

The eventuality does not fall within the purview of the 1946 miracles, for the people of this country have been led to believe that war with Russia was in the immediate offing. But, it has not happened, and it may be that 1947 will witness the consummation of that miracle.

"The First 100 Years"

▶▶▶ IN THE WORDS OF Joseph Anderson, "There is nothing that solidifies and strengthens a nation like reading of the nation's own history, whether that history is recorded in books, or embodied in customs, institutions, and monuments."

If such a statement is true of a nation, it is equally true of an industry. In fact, the present day pulp and paper industry is the accumulated result of all activity, good and bad, within the industry since its founding on this continent in 1690.

It is believed that all too few of the persons concerned with the operation of pulp and paper mills know far too little of the history of the industry—particularly that which gives background to the scene of today. In fact, how many of the present day pulp and paper mills have made any attempt to record their own activities in a way that they might be helpful to the future of the individual business or of the industry as a whole?

The thought has been and is still expressed by some men who should be interested in such an endeavor that they have been so busy doing things that there hasn't been time to record them. Thanks, therefore, go to the men who have taken the time either to pass on information of historical importance by word of mouth so that it could be written up by others or who have written such material themselves.

Without this record, even the men too busy to aid in its compilation, would have been unable, knowingly or otherwise, to have cut the paths which they have during their business careers.

Probably the most recent book to be published that reveals the history of the papermaking industry of this country is a work entitled *The First 100 Years*. This book, which made its appearance during the year just ended, tells the story of Perkins-Goodwin.

It is an interesting and dramatic presentation. Just as stated in the foreword by Louis Calder, in commenting on the purpose of the work, it reveals the relation of the firm to the industry it serves.

Documenting 100 years of business activity, it is hoped that the volume will prove to be only a stepping stone to another centennial and that it also may encourage other firms in our industry, each in its own individual way, to chronicle its attainments.

This Year Will Be DECISIVE!

WILLIAM SIBLEY

▶▶▶ WHILE THE YEAR just ended was momentous, we stand on the threshold of another year which promises to be far more momentous. Ahead there are many grave anxieties, yet they are seasoned and tendered by the condiment of good hope. Certainly the outlook for 1947 is brighter than was the outlook of twelve months ago. Then deep distrust and acute suspicion were world-wide. Many said the world was splitting into two hostile camps, one led by Russia, the other by the United States and Britain. With the United Nations still to meet for the first time, its success seemed far away. Economic bases and political stabilities were unfirm. The United States, steeringhead for world economic currents, was torn by bitter and costly strikes, and long labor-management disputes. With the close of 1946, many of the situations seem considerably improved. Russia and the Western Powers have made manifest a determination to agree on essential issues. Accord on the principles of disarmament has been reached; the United Nations is a going concern, while both labor and management seem anxious to avoid a showdown fight.

From 1946 the New Year inherits two basic questions: (a) Can Russia and the West reach lasting agreement and confidence? (b) what will be the course of the United States both at home and abroad? Upon the answers to these questions depends the fulfillment (or frustration) of hopes that the world's economic and political problems may be solved quickly and successfully.

In addition to the serious problems that affect the entire world, there are separate problems—of Europe, of the Middle East, of the Orient and of the Americas.

As we look at the globe we see three paramount governments in steady opposition to each other. There is communist Russia, dedicated to the Marxian philosophy of "class struggle" and intent upon maintaining "friendly governments" in states beyond her borders. There is Socialist Britain, dedicated to the philosophy of nationalization of economy, and intent on reshaping the structure of a weakened empire. Finally, there is Capitalist United States, dedicated to the philosophy of free enterprise, and intent upon maintaining its world position. Can these conflicting aims be resolved and international amity and unity be attained? The whole future of the United Nations, the solution of arms regulation, the control of the atom bomb and other weapons which can destroy civilization—all these depend on the will of the aforementioned three to co-operate with universal trust.

As we look at Europe we find the political, ideological and economic interests of Russia and the West clashing head on over the disposition of Germany—still a nation of 60,000,000 people and a country of 142,000 square miles. As usual there is trouble in the Balkans, but today the trouble is not purely of Balkan consideration. The three great powers are vitally concerned, and we look forward to the results of the meeting of the U. N. Commission which started to study this problem last January. Franco Spain is still an international question mark. Russia would like to depose anti-Soviet Franco, while the United States and England oppose this on the grounds no one should interfere with any nation's internal affairs. Of course, behind the argument is the fear that with the overthrow of Franco, Russia will be successful in establishing a Communist State on the Iberian peninsula—an eventuality very abhorent to American-English principles.

Looking to the Middle East we find Russia demanding a dominant voice in the control of the Dardanelles; laying claim to provinces in Turkey which border the Black Sea; seeking to increase her influence in Iran. Britain, with strong American support, is resisting all these moves. This struggle has for its center the principality of Palestine and it involves the millions of Arabs in other Moslem countries, which if angered over the Jews in Palestine might welcome Russian intervention, thereby making it well-nigh impossible for Britain to maintain her Mediterranean lifeline.

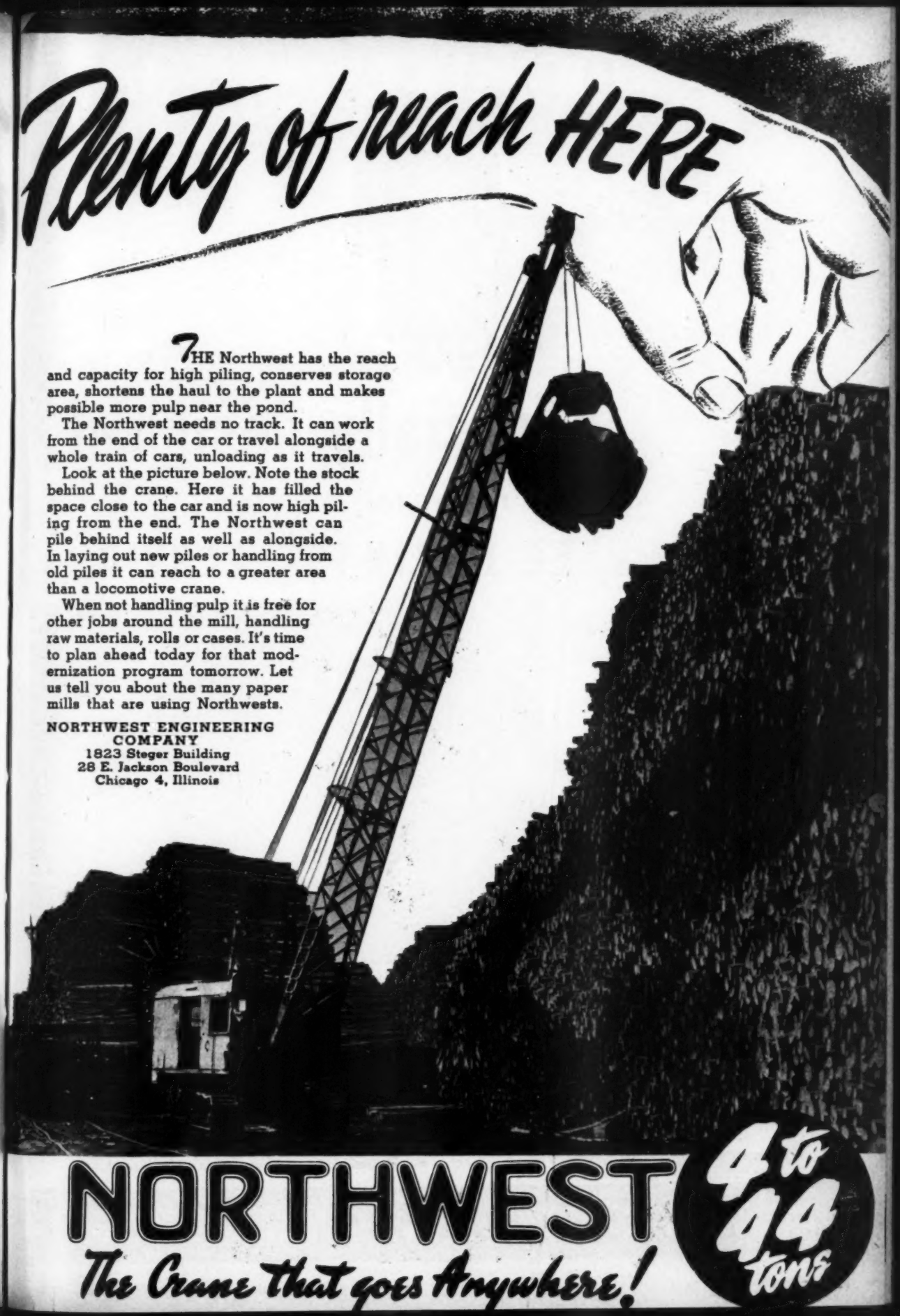
In the Orient we find the far eastern empires of Britain, Holland, and France slipping away from foreign control. Britain already has offered India her freedom, but the Moslem-Hindu civil war is proving to the world their incapability of handling themselves. Militant nationalists are becoming more and more successful in freeing Indo-China from France, while Indonesia is well on its way to independence of the Dutch. Even the empire problems seem as far from solution as they ever have been due to the clashes between the Kuomintang and the Communists. While Japan presents a surface stability, due to the rule of an occupation government under General MacArthur, there is an under-current demand by Russia for a stronger voice in Japanese affairs.

Here in America we still have unsolved labor-management disputes, in which there lies the threat of still more crippling strikes at a time when American production is needed to help rebuild war-torn nations. Because of our pre-eminent influence on international economy, many foreign nations are fearful that industrial instability here would lead directly to a depression of world-wide proportions.

Still another question here is the durability of the Pan-American "Good Neighbor" policies which have been built up during the past fifteen years. The chief threat to that system is the diplomatic problems now existing between the American government and the Argentine government. Argentina has considerable support among other South American countries and in many ways she has been successful in convincing her sister nations that the United States interests south of the Panama Canal are based on predatory imperialism. This problem is now being burnished to higher lustre by the fact that a new Republican Congress has yet to establish itself and show the world its degree of isolationism or internationalism.

Can Russia and the West reach lasting agreement and confidence?

What will be the course of the United States both at home and abroad? Those are the *two 64-billion*-dollar questions for 1947—the Decisive year.


Plenty of reach HERE
THE Northwest has the reach and capacity for high piling, conserves storage area, shortens the haul to the plant and makes possible more pulp near the pond.
The Northwest needs no track. It can work from the end of the car or travel alongside a whole train of cars, unloading as it travels.
Look at the picture below. Note the stock behind the crane. Here it has filled the space close to the car and is now high piling from the end. The Northwest can pile behind itself as well as alongside. In laying out new piles or handling from old piles it can reach to a greater area than a locomotive crane.
When not handling pulp it is free for other jobs around the mill, handling raw materials, rolls or cases. It's time to plan ahead today for that modernization program tomorrow. Let us tell you about the many paper mills that are using Northwests.
NORTHWEST ENGINEERING COMPANY
1823 Steger Building
28 E. Jackson Boulevard
Chicago 4, Illinois
NORTHWEST
The Crane that goes Anywhere!
4 to 44 tons

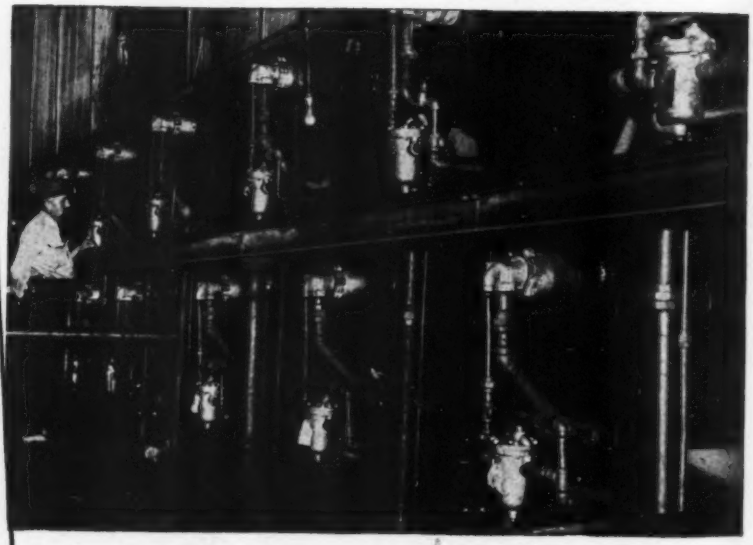
Specially designed

for paper machine

DRYER DRAINAGE SERVICE

QUICK FACTS

- **SPECIAL DESIGN.** Armstrong has designed a trap to meet the special requirements of draining individual paper machine dryers.
- **BIG AIR HANDLING CAPACITY.** Vents air from cold dryers; continues to purge air from hot dryers.
- **FACILITATES PRESSURE CONTROL.** Provides a definite stopping point for live steam; permits accurate control of steam pressure (and temperature) in each dryer.
- **TROUBLE-FREE PERFORMANCE.** Very simple construction. All stainless steel mechanism of same design and construction used in forged steel traps for 1500 p.s.i. and 900°F.
- **LONG LIFE—LOW MAINTENANCE.** Where ordinary traps wear out rapidly on paper machine service, the specially designed Armstrong trap has demonstrated ability to stay on the job with no more maintenance than for ordinary service.



Engineering Service . . . Armstrong Machine Works specializes in solving paper machine drainage . . . pressure control . . . temperature control . . . and sheet moisture control problems. If you have a special problem, check with Armstrong for an efficient economical solution. If you need modern, efficient drainage, use Armstrong paper machine traps.

ARMSTRONG MACHINE WORKS
816 Hoffman St., Three Rivers, Michigan

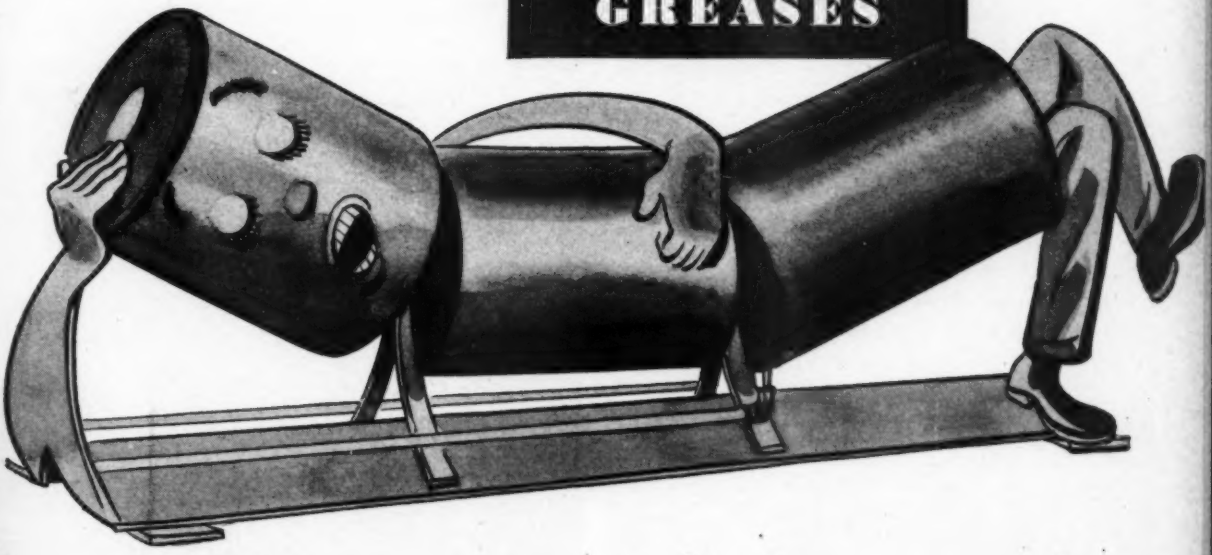
Inverted Bucket Steam Traps for Every Paper Mill Requirement

ARMSTRONG STEAM TRAP

Dryer Drainage System Trapping and Engineering

Wake up idle idlers with

SUPERLA
GREASES



Save power... belts... and material-handling time on conveyors

ARE CONVEYOR IDLERS slow to start up in cold weather? Do they heat up, throw off grease, and run dry when the weather's hot?

A change to a better lubricant may make these lazy idlers carry their share of the load—and incidentally save on power, belt wear, and material-handling time.

Superla Greases are ideal for idlers. Grades are available that permit idlers to turn readily at low temperatures, yet these lubricants do not thin out or separate when normal operating temperatures are reached. Where temperatures are above normal (over 175°F.), Superla X Greases resist separation and oxidation, and have good sealing quality.

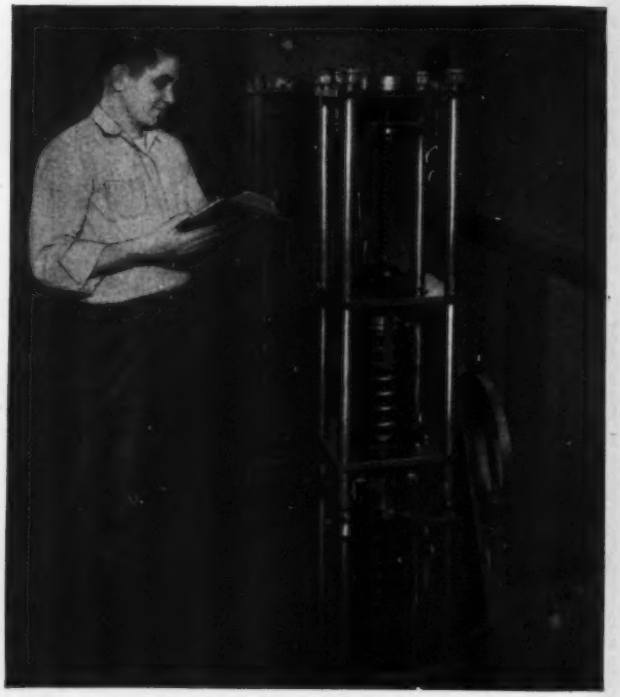
A Standard Oil Lubrication Engineer will gladly help you make a test. Standard Oil Co., (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

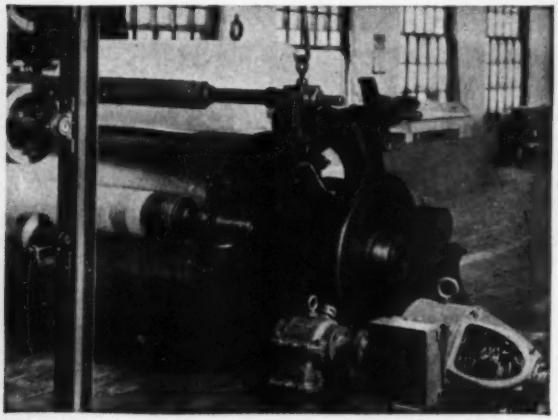
do you know Roller Chain...

is actually elastic!

1 AND HERE'S WHAT that means to you. Where your equipment is subjected to momentary overloads and sudden strains, the inherent elasticity of roller chain will help absorb those damaging shocks and protect your equipment.



2 WE'VE ACTUALLY PROVED that roller chain is elastic. With this testing machine, designed and built by our engineers, we stretch this small section of Baldwin-Rex Roller Chain about ⅛-inch with each load application. We do this more than 10,000,000 times. Each time the chain must withstand the load and retract to its original length in order to meet our rigid specifications.



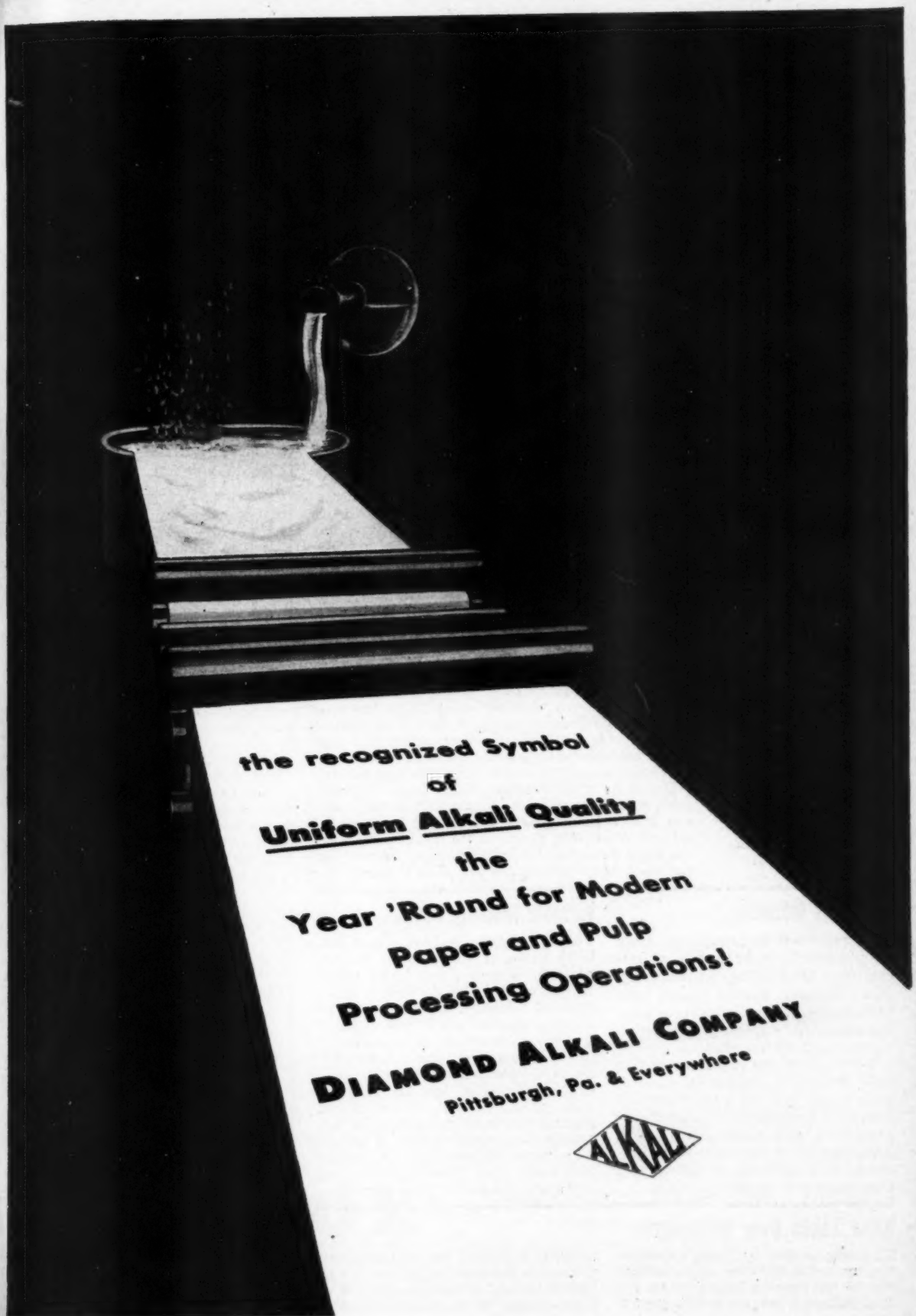
3 TAKE THIS COATING MACHINE. The elasticity of that Baldwin-Rex Roller Chain drive absorbs the shock loads . . . delivers the smooth, positive flow of power so necessary for even coating. Throughout your mill, you'll find this elasticity a big help in reducing spoilage and stepping up production.

You can simplify replacement, generally cut costs and improve deliveries by specifying standard roller chains. Your Baldwin-Rex Man will be glad to give you all the facts and help you with your application problems. Call him or write us direct.

BALDWIN·REX

ROLLER CHAINS

BALDWIN-DUCKWORTH DIVISION OF CHAIN BELT COMPANY
367 Plainfield Street, Springfield 2, Massachusetts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the
Year 'Round for Modern
Paper and Pulp
Processing Operations!
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Advertisement JANUARY, 1947

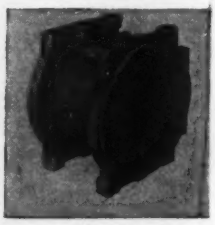
R-S valvEvents

ISSUED PERIODICALLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH FLOW CONTROL AND SHUT-OFF

The Iron Hand in the Velvet Glove

Patented renewable replaceable rubber liner

Installing liner in valve body



Rubber liner in position

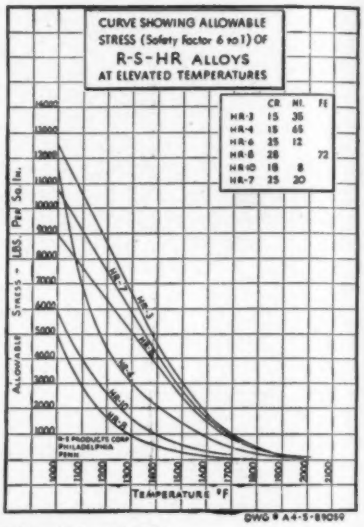
Old-timers who think of a butterfly valve as a "slap-happy damper," or as a valve that "always leaks" even when presumably tight-closed, are looking pop-eyed at the performance of the new R-S rubber-sleeved Butterfly Valve.

This is the modern equivalent of the iron hand in the velvet glove, with the trifling difference that it's a steel hand in a rubber glove.

The rubber spool (patented) is renewable and replaceable. Months of experimentation were given to developing a rubber of precisely the right characteristics of flexibility and toughness within the temperature range of −20° to plus 200°F. The spool, which fits somewhat loosely within the valve body, acts as a seat and seal for the wedge-type closing action of the butterfly vane. As the vane approaches the closed position, the rubber bunches up around the periphery of the vane, including the critical points in the area of the shaft-bosses, and forms a perfect seal.

The new valve has been subjected to rigorous tests proving its ruggedness and efficiency. One of the most satisfactory tests, because not carried out under laboratory conditions, was engineered by a manufacturer of powdered glue. He set the valve up in a line so it could be fully opened by a cam, then slammed shut by a 50-pound weight. This test was repeated 9,000 times. At the end of the test, the rubber-sealed valve was still giving perfect closure. The new R-S rubber-sealed valve is available in sizes to handle 15 to 125 p.s.i. using 125-pound standard American flanges.

One of its great advantages is the ease of replacement, though the evidence of many tests indicates this will seldom be necessary. The method is shown in pictures at left. The flanges of the spool line up with the metal flange bolt-holes and eliminate the need for the usual flange-gaskets, a worth-while economy.


CURVE SHOWING ALLOWABLE STRESS (Safety Factor 6 to 1) OF R-S-HR ALLOYS AT ELEVATED TEMPERATURES
CR NI FE
HR-3 15 35
HR-4 15 65
HR-6 25 12
HR-8 28 72
HR-10 18 8
HR-7 25 20
ALLOWABLE STRESS - LBS. Per Sq In.
TEMPERATURE °F
R-S PRODUCTS CORP PHILADELPHIA PENN
DWG # A4-5-81050

"Hard to Get"

Information on the behavior of metals at temperatures above 1200° is not easily come by. The curves herewith have been worked out by R-S Engineers to show the stress resistance of various heat resistant metals at elevated temperatures.

H-R metals are stainless steels and stainless iron developed through study of valve requirements. Three of these metals show allowable stress of 2000 p.s.i. between 1500° and 1600°F., and 1000 p.s.i. at nearly 1700°F.

The relative paucity of information on stress resistance at high temperatures gives the chart unusual value to engineers. A copy may be had by inquiry of D. W. Hopkins, Vice President, Valve Division, R-S Products Corporation.

R-S Fights Inflation

The opportunity is present for many manufacturers to make the most of freedom from OPA ceilings on machinery. Many are using elevator clauses ruthlessly so that the buyer cannot even guess approximately the spread between ordering price and delivery price.

R-S Products' cost system is such that their Production Department can tell what it costs to make a given type and size of R-S Butterfly Valve today as compared with what it cost last Tuesday. Thus they are in a position to hold increases to a minimum as well as keep clear of runaway guesswork pricing.

Versatile Butterfly Valves

The high efficiency and low cost of Butterfly Valves is widely known but not generally recognized, paradoxical as this may sound. Actually, the fields in which Butterfly Valves are operating with characteristic efficiency are as wide as Industry itself. Users include the biggest names in air-conditioning and refrigeration, aviation, chemical processing, coke, foundries, heat-treating, heat exchange systems, production and refining of oil, paper and pulp mills, rubber production, sewage and water works, shipyards, soap plants, solvent recovery systems, steel mills, sugar refineries, textile and dye-works, and power plants generally.

Complete R-S Valve Installation Data

Engineers like the complete dimensional data supplied for R-S Butterfly Valves. Dimensions are tabulated by standard sizes under stock types and identified by letters corresponding to detailed drawings which accompany the tables. Six full pages of R-S Products' Catalog No. 14-B (copy on request to R-S Products Corporation, Wayne Junction, Philadelphia 44, Pa.) are devoted to this basic installation data.

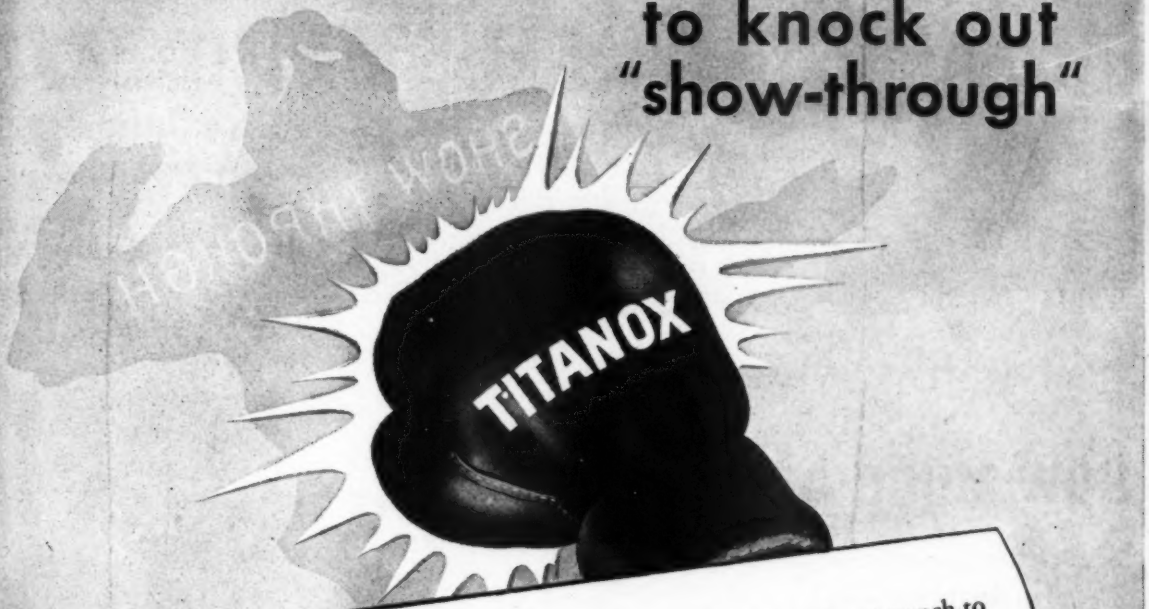
JMLee P-A 2

Kone Takes Over Washington

It is amazing how things are changing in Washington these days! First the Republicans—well, you know about that! Now Kone Engineering Company of 11 West 25th Street, Baltimore, is taking over the Washington D. C. territory for R-S Valves. Kone has been Baltimore distributor for R-S Valves for some time past and continues to handle the Baltimore territory. He will handle Washington from the present Baltimore office.

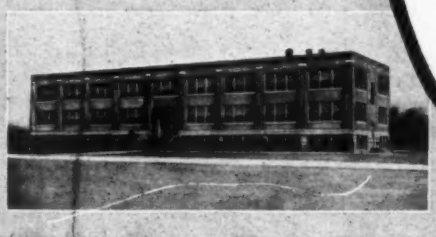
TITANOX . . . *the brightest name in titanium pigments*

put in TITANOX to knock out "show-through"



Use TITANOX to deliver a knock-out punch to the costly grey "show-through" ghost. These widely-known and widely-used titanium pigments do it by an unusually thorough job of opacifying. For whitening and brightening paper stocks of all weights, TITANOX has set the quality standard for many paper manufacturers who pride themselves on their high grade output.

The makers of TITANOX invite you to submit your paper opacifying and whitening problems to their Technical Service Department. The competent staff in charge will be glad to serve you.



Industry has profited by a host of basic advances in titanium pigment pioneered in Titanium Pigment Corporation research laboratories such as this one at Sayreville, New Jersey. Here highly experienced technicians experiment constantly to improve existing grades of TITANOX pigments and to develop new types.

TITANOX

TRADE MARK

TITANIUM PIGMENT CORPORATION

Sole Sales Agent

111 Broadway, New York 6, N. Y.
104 So. Michigan Ave., Chicago 3, Ill.
350 Townsend St., San Francisco 7, Cal.
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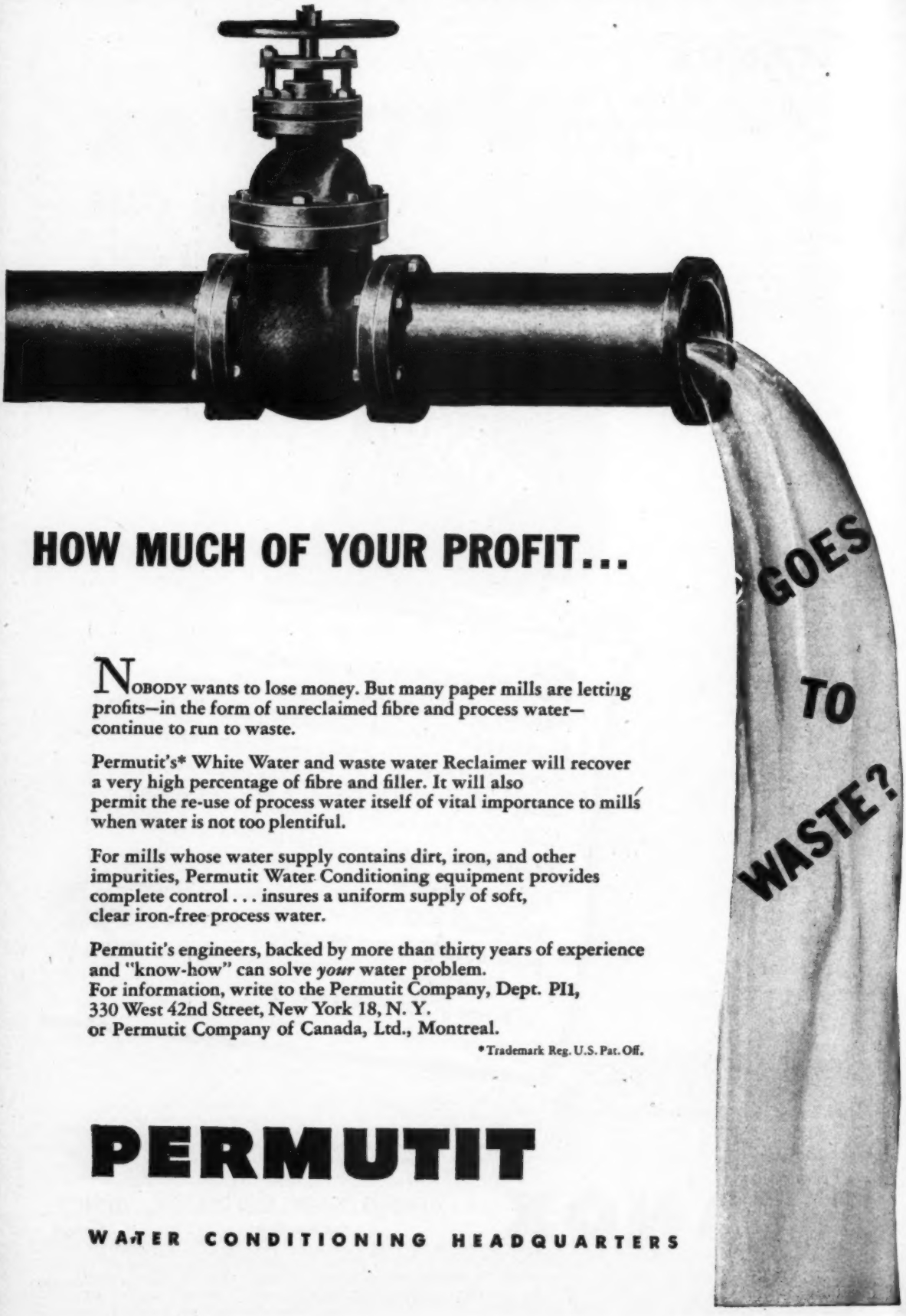

HOW MUCH OF YOUR PROFIT...

NOBODY wants to lose money. But many paper mills are letting profits—in the form of unreclaimed fibre and process water—continue to run to waste.

Permutit's* White Water and waste water Reclaimer will recover a very high percentage of fibre and filler. It will also permit the re-use of process water itself of vital importance to mills when water is not too plentiful.

For mills whose water supply contains dirt, iron, and other impurities, Permutit Water Conditioning equipment provides complete control . . . insures a uniform supply of soft, clear iron-free process water.

Permutit's engineers, backed by more than thirty years of experience and "know-how" can solve *your* water problem.
For information, write to the Permutit Company, Dept. PI1,
330 West 42nd Street, New York 18, N. Y.
or Permutit Company of Canada, Ltd., Montreal.

*Trademark Reg. U.S. Pat. Off.

PERMUTIT

WATER CONDITIONING HEADQUARTERS

Draper's

ATLAS OF AMERICAN PAPERMAKING

No. 25 PUBLISHED BY DRAPER BROTHERS COMPANY • CANTON, MASSACHUSETTS

Map copyright by L. D. Post, Inc., New York, N. Y. American Map Co., New York, N. Y.

HIGH LIGHTS:

Mississippi, another recent paper making state, is in a position to make helpful contributions to alleviate the building shortage. With the exception of one company which is a big factor in the production of bleached kraft and bleached machine glazed specialties, its mills are concentrating upon building and industrial paperboard.

One makes insulating and hard board, another wood fibre and general purpose boards and a third, wood fibre insulation and structural board.

Such products have proven their economy and utility during the war in the speedy fabrication of army barracks, USO clubhouses and their like. The rated daily capacity for all of Mississippi's paper mills is given as 1,095 tons in Post's Paper Mill Directory for 1945.

Draper Felts for Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

Canton, Massachusetts

RALPH E. BRIGGS, Sales Manager

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ENGINEERS AND MANUFACTURERS
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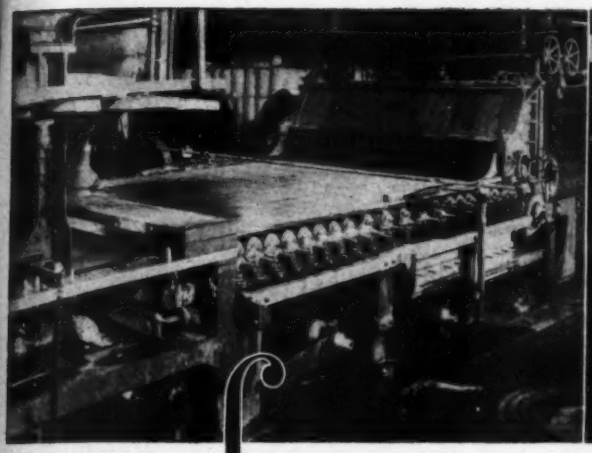
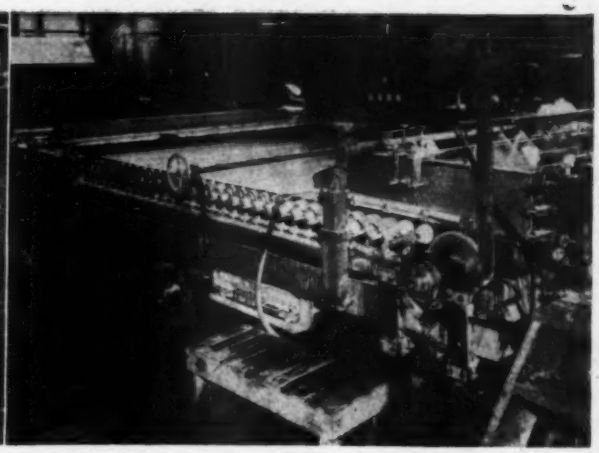
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD





fourdrinier fallacies

It is a fallacy to view the conventionally designed Fourdrinier as the last word.

It is a fallacy to think that only a few days' service is a fair span of wire life.

Today far more efficient headboxes are available—with Hydronamic Inlets an integrated feature.

Today an improved suction box design is available and it is easier on the wire.

Non-corrosive save-all trays and rails lighter and cleaner.

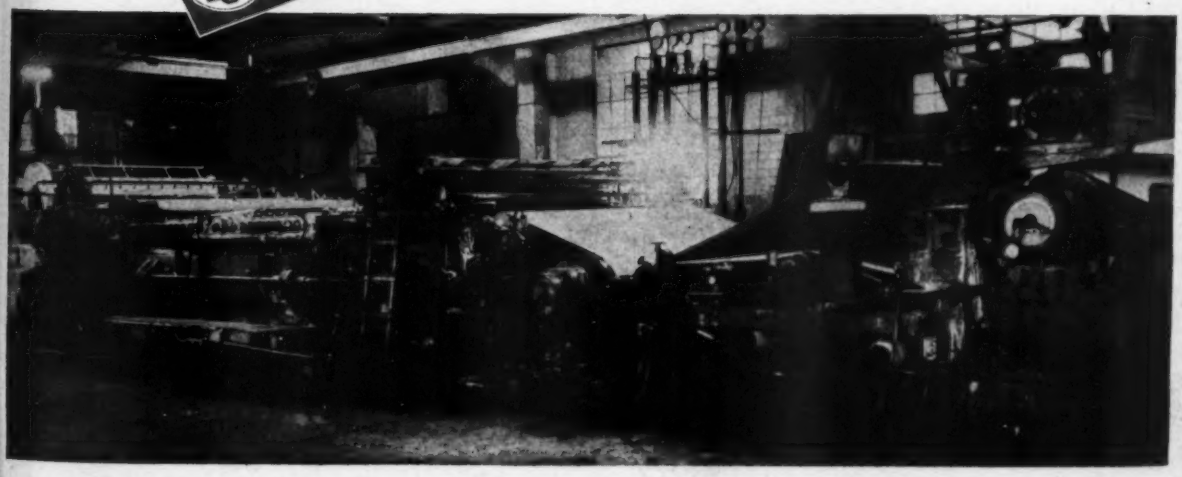
Engineered design makes all moving parts readily accessible for ease of cleaning and replacing wire.

In Fourdriniers of Black-Clawson design these and several other important steps forward have been taken and we would like to go over the drawings with you.

FOURDRINIERS UP TO 246" • CYLINDER MACHINES

THE BLACK-CLAWSON COMPANY, Hamilton, Ohio

Divisions:
SHARTLE BROS. MACHINE CO., MIDDLETOWN, OHIO
DILTS MACHINE WORKS, FULTON, NEW YORK
Associate: ALEXANDER FLECK LIMITED, OTTAWA, CANADA



EASY TO HANDLE

. . . economical to USE!

REED-PRENTICE Timberhog Gasoline powered chain saws are *easy to handle* because of their exceptional light weight, due to aluminum or magnesium die-cast parts.

Economical to use — because of low initial cost, low fuel consumption, minimum maintenance and increased production speed. One minute to notch and fell a 14" hard oak tree with the Timberhog two man gas saw!

The air-cooled, 2 cycle, 4 H. P. gas engine delivers power far in excess of load requirements. It's easy to convert the 20" one man Timberhog to a two-man saw.

Illustration above shows the bumper spike of the one-man Timberhog being used as a pivot point, relieving the operator from the strain of lifting the saw while at work.

Investigate the many features of the Timberhog—the saw that does your work 5 times as fast as hand cutting. Write for folder and name of nearest distributor handling the complete line of gasoline, air and electrically driven Timberhog chain saws.

Close-up view of how spikes act as pivot on one man Timberhog.

Bucking with the two man Timberhog is quickly done with this lightweight, portable model.

Limbing of fallen timber is easy with the one man Timberhog.

PRICES

20" One man Timberhog Weight 52 lbs. . . .	$325.00
24" Two man Timberhog Weight 54 lbs. . . .	$335.00
30" Two man Timberhog Weight 57 lbs. . . .	$345.00

(All prices F. O. B. Factory)

ADDRESS ALL INQUIRIES TO TIMBERHOG DIVISION DEPT. K.

"TIMBERHOG" SAWS

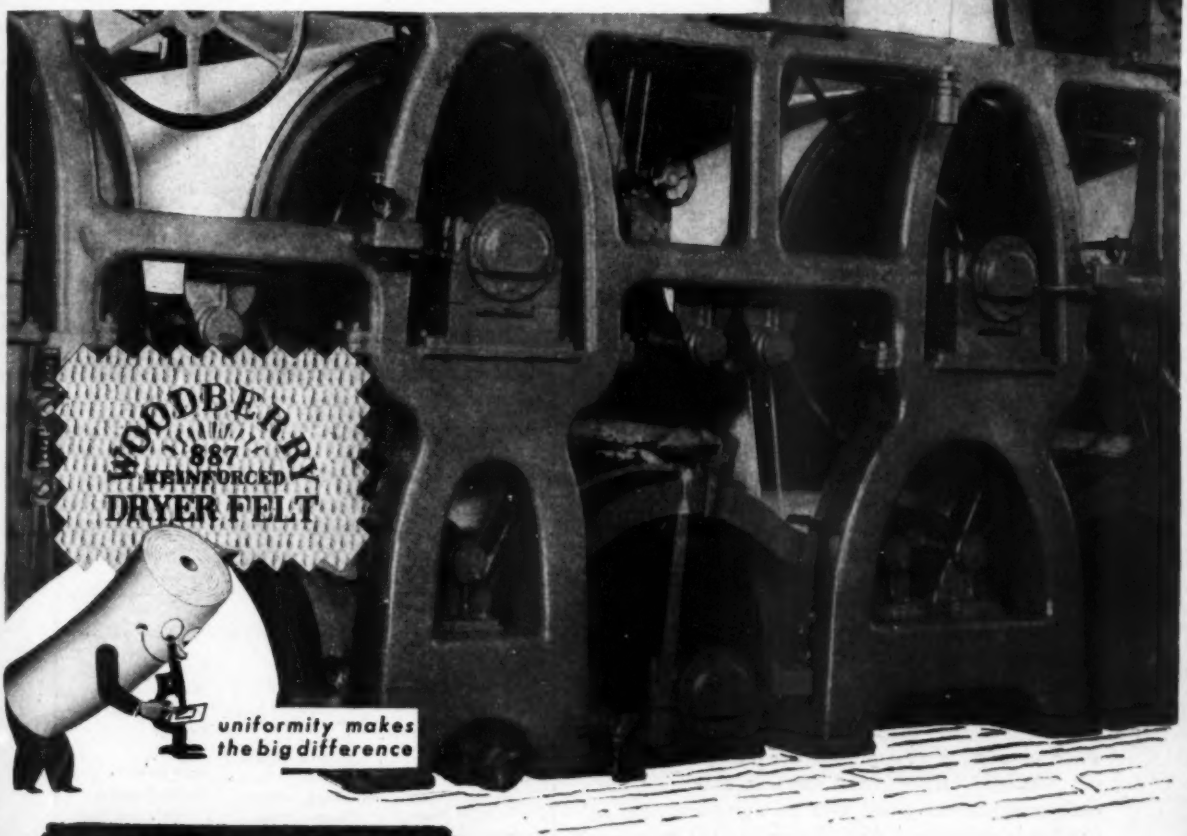
REED-PRENTICE CORP.

WORCESTER MASS., U.S.A.

The Dollars and Sense of Choosing Woodberry 887 Dryer Felts

Many hours of extra wear result from the patented feature of Woodberry 887 reinforced dryer felts. Asbestos yarns woven at scientifically determined intervals into the face of Woodberry 887's gives them the extra face value that means extra wear.

Reports from mill after mill all over the country show the important economies this added asbestos protection has effected for them. You, too, can profit from longer wearing dryer felts when you specify Woodberry 887 reinforced dryer felts.



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TWELVE KEYS to Steel-Service

Ryerson Steel-Service plants now stand in twelve great cities—key points covering the nation's principal steel markets. Cooperating fully, the twelve-plant Ryerson system means broader facilities, shorter shipping distances, and the assurance of prompt delivery of all products in stock.

The plant near you employs the best of modern handling and cutting methods, from order desk to shipping department. It is planned and operated to meet your steel needs accurately and deliver them in a hurry.

Under present conditions we are often unable to fill all your requirements—much as we would like to. Because of great demand and frequent work stoppages many products may not be in stock when you call. But if your order includes an item not readily available, our steel-service men are well qualified to assist you in the search for a practical alternate. And Ryerson continues as your best source for a wide variety of steels.

Whether you need a single piece of steel or several tons, your order receives thorough, personal attention. So, phone or write or wire your nearest Ryerson plant whenever you need steel.

Joseph T. Ryerson & Son, Inc, Steel Service Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

PRINCIPAL PRODUCTS

- Bars—
  - hot and cold rolled
  - alloy steel
  - reinforcing
- Structurals
- Plates—
  - Inland 4-Way Floor Plate
- Sheets
- Strip Steel
- Mechanical Tubing
- Boiler Tubes and Fittings
- Allegheny Stainless—
  - Sheets, plates, shapes, bars, tubing, etc.
- Tool Steel
- Wire, Chain
- Bolts, Rivets
- Babbitt
- Solder
- Wire Fabric
- Metal Working Tools and Machinery, etc.

RYERSON STEEL

THE PAPER INDUSTRY
and PAPER WORLD

JANUARY, 1947

Fundamentals of Calendering

G. A. SCHOONKIND, Chemical Engineer
Van Gelder Zn. Paper Mills (Velsen, Holland)

EDITOR'S NOTE: This manuscript was written in 1943 in an attempt to explain the action of a supercalender. It was prepared because of plans to substitute antifriction bearings for Falz bearings in a 12-roll supercalender and because of differences of opinion relative to a possible change in calendering effect that would result therefrom. . . . An article by J. A. Van den Akker, The Institute of Paper Chemistry, on "The Possible Role of Shear in Calendering," published in the April, 1946, issue of THE PAPER INDUSTRY AND PAPER WORLD, was read by the author and prompted him to submit this material.

IN THE EARLY DAYS of papermaking, probably up to the 10th century, the use requirements of paper did not necessitate a smooth surface. However, when the Arabs started papermaking in North Africa, they used a more viscous ink and a finer handwriting than the Chinese. Subsequently, therefore, they had to look for a means of improving the paper finish.

To this end, the Arabs developed stone glazing, a procedure which involved the placing of a sheet of paper on a square plank of walnut wood, after which it was rubbed with a piece of agate, flint, or glass. Papers glazed in this way were of astonishingly high smoothness and gloss. So satisfactory was this finishing process that even today it is being used in special cases, the stone, however, being moved mechanically over the sheets rather than manually.

About 1500 A.D., hammer finishing (not in the modern sense) was introduced in competition with stone glazing. This process, probably coming from Central Europe, consisted of placing a sheet on a flat anvil and then striking it with a hammer having a polished surface and driven by waterpower.

Plate glazing which brought an end to hammer finishing was the next development. It resulted from experiments made early in the 19th century in Holland or in England. These experiments, imitating a method used by textile makers, consisted of passing paper sheets between copper rolls under pressure. Soon the process took the form of placing the sheets between polished zinc plates and then passing a pile of sheets and plates between heavy steel rolls under high pressure.

The revolution in the paper industry, caused by the invention of the fourdrinier paper machine, brought about a need for finishing paper in

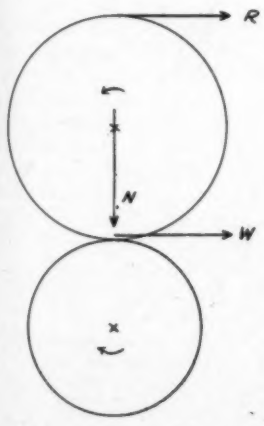

Fig. 1

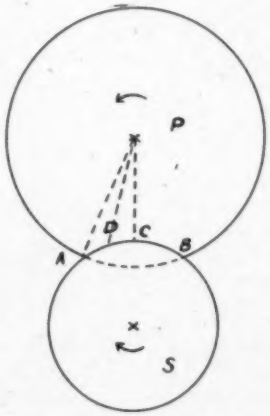

Fig. 2

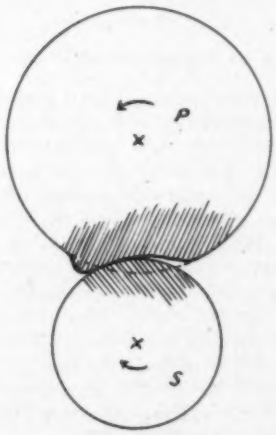

Fig. 3

endless webs. The supercalender was developed about the middle of the 19th century to meet this need and soon after its introduction the earlier processes were limited to a few special sorts of high class papers.

Effect of Pressure and Friction

The ancient papermakers knew that a smooth and glossy surface could only be obtained by the rubbing action of the glazing stone brought about by moderate pressure on the paper.

The old hammer finishing process produced a smooth paper but without high gloss. This method was characterized by a rather high pressure without practically any appreciable rubbing effect.

In plate glazing, there is the effect of both high pressure and a certain amount of friction. The zinc sheets move over a distance of some millimeters relative to each other during passage between the rolls and, in this way, polish the paper sheets.

In each of these several cases, there appears to exist a correlation between the degree of friction and the gloss of the finished sheet, whereas smoothness is produced mainly by the pressure exerted on the paper. This combined action can be explained simply by considering a sheet of paper with an irregular surface as a sheet of plasticized material (plasticized by its moisture content). Pressure on this irregular surface will cause plastic deformation of the high parts, thus diminishing the degree of irregularity and resulting in a smoother surface. Friction together with little pressure mainly deforms and polishes the high parts, thus producing a high gloss but having less influence on smoothness. Friction and high pressure together, on the other hand, homogenizes the sheet by displacing the irregularities and also polishes its entire surface.

Action of Supercalender

The smoothness and gloss produced by a supercalender indicates that here is a combined action of pressure and friction. The source of friction, however, is not so evident as in the older glazing processes. Even as late as 1939, Brecht and Steinbock, in an excellent article (*1*) on the influence of paper and calender variable on supercalendering, stated that the fundamental factors in glazing are pressure and friction, but that "only vague and speculative theories exist about the way of co-operation of both factors and the source of friction."

Up to about 1935, most papermakers claimed that bearing friction caused a slip, or a difference in surface velocity, between the driving and the driven rolls, thus producing a deformation of the paper web between the rolls as well as a polishing effect analogous to the friction calender. A certain amount of bearing friction was thought necessary to produce a good finish. Yet, the changing of many supercalenders to antifriction bearings showed no decrease in finish.

Wunderlich (*2*), in 1935, concluded that glazing was not produced by slip of the rolls but by deformation of the rolls in the pressure zone. In 1937, Schagen (*3*) tried unsuccessfully to defend the old slipping theory. Dittmar (*4*) and Wamser (*5*) brought the concepts of Wunderlich into a more scientific form.

Roll-to-Roll Slip

Does roll-to-roll slip really exist? Some measurements, made in 1888 and 1911, are found in the literature (*6, 7*). Likewise, in this investigation, exact measurements of slip were made on the 12-roll supercalender previously mentioned. This supercalender, equipped with Falz bearings and driven from its third roll, showed a top to bottom slip of 0.3 per cent when glazing a writing paper. The same calender, running without paper but with other conditions being the same, showed a comparable slip of 0.2 per cent.

Is this slip caused by bearing friction? Consider two noncompressible rolls (Figure 1), the lower one being the driving roll. Let R represent the force or action of the bearing friction that is resisting the rotation of the upper roll. To overcome this resistance the driving roll must exert a force W which equals R. As long as W is less than $f \cdot N$ (f equals coefficient of friction; N equals pressure between the rolls), the surface velocity of both rolls will be the same and no slip occurs. When R becomes larger than $f \cdot N$, the upper roll cannot rotate, thus the slip is 100 per cent. Conclusion: the slip in this case is either zero or 100 per cent.

Now consider the two rolls as being elastic (Figure 2): a steel roll S drives a paper roll P. Neglecting the deformation of the steel roll, Dittmar (*4*) cites two extreme cases and makes the following analysis:

1) The velocity of the free surface of both rolls is the same.

In this instance, the velocity of a nip point D of paper roll will be less than the velocity of the corresponding point on the surface of the steel roll. This decrease in velocity is due to the shortened distance of D from the axis of P. Actually the velocity increases from A to C, and then there is a decrease in velocity from C to B.

Such a change in surface speed of the paper roll causes a shearing stress on the paper web as it passes between the steel and the paper roll during calendering.

2) The velocity of both surfaces is equal in position C.

This position results in a difference in free surface velocity of both rolls. The difference decreases from A to C, is zero at C, and increases from C to B.

Dittmar also states that, depending on the calendering conditions, equal velocity is possible at any point between A and C.

An objection to the theory of Dittmar is the equal velocity of the paper roll and the steel roll in case 1, and a greater velocity of the paper roll than the steel roll in case 2 and all possible cases between 1 and 2, thus producing a negative slip which is not possible. Therefore, the explanation of Dittmar cannot account for the actual slip; and moreover, a mathematical analysis of the forces involved in his concept uncovers more impossibilities.

Wamser (*5*) complicated the hypothesis of Dittmar by assuming a finite velocity of formation which results in a bulge before the entrance of the nip and a retardation of resilience on the exit side (Figure 3).

Dittmar's concept of the problem is not entirely wrong, but it is insufficient. He takes into account only the radial elasticity of the paper roll and neglects tangential elasticity.

Tangential elasticity was first considered by Jahn (*8*) in 1928 in considering the problem as it concerned the rolling of a railway wheel.

Figure 4 illustrates the application of Jahn's concept to the calender problem. Here, the paper roll P is driven by the steel roll S; and, again, the action of bearing friction is represented by the force R.

Suppose that the rolls P and S are elastic only in the tangential direction—not in the radial, the contact between them only existing at point A. A small element of the surface of P, having a length Δl, just before the nip, will be stretched by the force W (equals R) necessary to rotate P. The new length will be $\Delta l\ (1 + e)$, e being the strain caused by W.

The stretched element will pass the nip and then immediately retake its original length.

The velocity of the stretched surface of P, passing the nip, will be equal to the surface velocity of the steel roll. Therefore, the velocity of the free surface of the paper roll will be less.

Calculation shows that the slip between the rolls equals e, when the latter is expressed in per cent. This slip, designated as deformation slip, is an

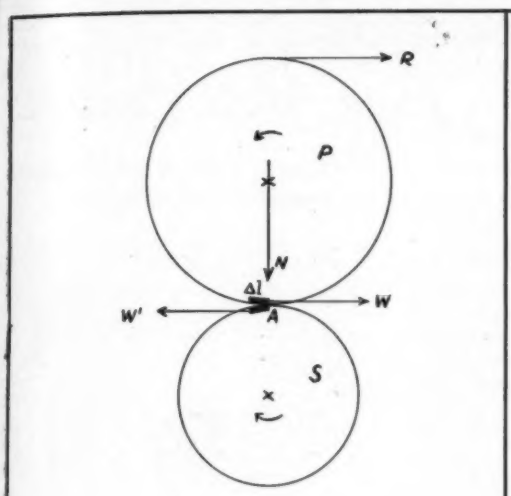

Fig. 4

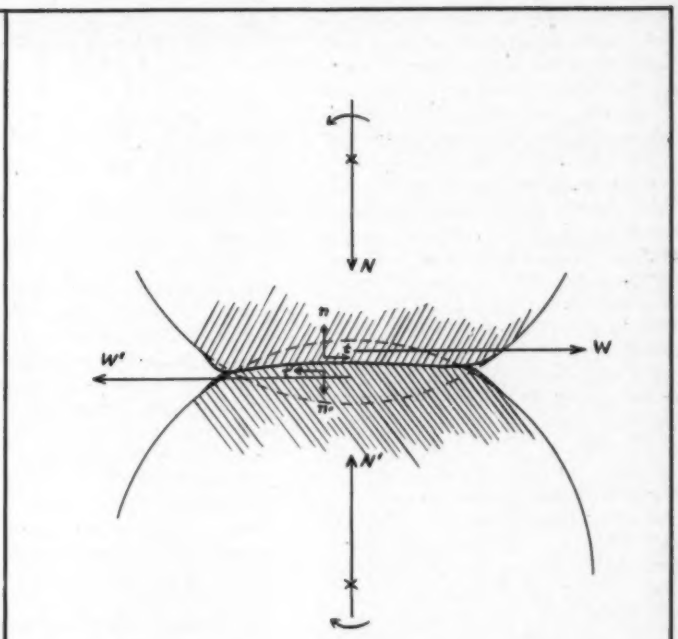

Fig. 5

apparent slip, as there is no sliding in the point of contact *A*. Its value depends on the force *R* being directly proportional up to the elastic limit.

Taking the elasticity of the steel roll into account, an element of its surface just before the nip will diminish in length because of the force *W* which is opposite and equal to *W'*. The new length will be $\Delta l\ (1 - e')$.

Therefore, the resulting total slip equals $e + e'$; thus tangential elasticity gives an explanation of the small slip measured in practice.

Fromm (*9*) in 1927, presented a mathematical analysis of two rolls having tangential as well as radial elasticity. His complete calculations are two long to reproduce. However, the principles of these calculations will be given.

Due to the radial elasticity (Figure 5), there will be a contact zone between the rolls. Pressure *N*, as well as force *W* which, as stated previously, is required to overcome the resistance of the driven roll, is distributed over this zone. These forces give rise to a normal stress *n* and to a tangential stress *t* in each point of the contact area.

The problem is to find the exact distribution of the two forces, *N* and *W* over the zone of contact. This distribution can be ascertained by calculating the deformation of each roll due to a pair of stresses, *n* and *t*, in a point of the contact zone. Integrating these deformations over the whole nip zone results in an expression giving the total deformation of both rolls.

To make the calculation, three integration conditions are used:

1) Two points opposite each other in a zone having a different velocity. Under this condition, *t* must equal $f \cdot n$ (*f* equals coefficient of friction). In the case of equal velocities, *t* must be less than $f \cdot n$. Also, outside the contact area $n = t = 0$.

2) Final deformation of both rolls having such a shape that contact exists over the whole zone.

3) Equilibrium between all stresses *n* and the total pressure *N*, as well as between all stresses *t* and *W*.

Fromm finally presents two integral equations in which *n* and *t* are expressed as a function of the position of the designated point in the contact zone. In solving these equations, the exact distribution of *N* and *W* over the contact area was known. Fromm solved them only in the case of two rolls of the same elasticity. Attempts to solve them by neglecting the comparative elasticity of the steel roll with that of the paper roll failed. It may still be an interesting prob'em for mathematicians.

In this case, however, it is possible to predict qualitatively what happens in the nip zone. If a pressure, which is not too excessive, is applied to the rolls, the zone of contact will be divided into two parts:

1) An area of apparent slip where opposing points have the same velocity. In a case of this kind, only deformation-slip occurs. There is no real slipping and *t* is less than $f \cdot n$.

2) An area of real slip where opposing points have different velocities. Here, deformation slip as well as real slip occurs, and *t* equals $f \cdot n$.

A point of the surface of a paper roll entering the nip zone undergoes an increasing tangential stress. This point cannot move relative to the steel roll because there is insufficient tangential stress to overcome the friction between the rolls (apparent slip area). At a given moment, the tangential stress becomes large enough to overcome this friction, and the point of the paper roll diminishes its velocity relative to the opposing point of the steel roll (real slip area).

The position of the transition point between the two areas depends on the amount of bearing friction, i.e., the value of the force *W*. When *W* is zero, the whole contact zone is in the apparent slip area. By increasing *W*, the transition point moves from the entrance side of the nip towards the exit side.

Now consider a plastic layer of paper between the two rolls. The coefficient of friction between the paper web and the paper roll will be much higher than that between the web and the steel roll. So it is assumed that there will be no displacement of the web relative to the paper roll during passage in the nip. However, in the points of the nip zone where the

tangential stress is large enough to cause plastic deformation of the paper, plastic flow will occur, thus smoothing the web. Moreover, in the area of real slip, a polishing effect will be produced by the differences in velocity of the rolls. This effect is especially pronounced on the side of the steel roll.

All the factors necessary for glazing paper, therefore, are found in the nip zone: (1) normal stresses for pressing the paper, (2) tangential stresses for plastic deformations, and (3) differences in velocity which produce gloss by polishing the web.

The tangential stresses and the width of the area of real slip in a supercalender increase from the top nip down to the bottom, both of these stresses depending on the force W which increases with the number of rolls situated above a considered nip. Thus the web undergoes an additional plastic deformation and a stronger polishing effect in each succeeding nip.

Equipping a supercalender with antifriction bearings in place of plain bearings will decrease the tangential stresses and the real slip areas of the nip zones. However, as long as the tangential stresses in a sufficient part of the nip zones are large enough to produce plastic deformation, and the areas of real slip are not too small, there will be no decrease in glazing effect. Yet the possibility exists that a further reduction of bearing friction will result in a decrease in smoothness. This critical point will depend on the composition and degree of plasticity of the paper web, and also on the pressure and velocity of the calender.

An exact solution of the equations of Fromm and a thorough study of paper plasticity probably will unfold a better understanding of the calendering process. The theory of the operation, however, as has been related herewith, catalyzes thinking on the subject as it concerns paper roll quality and the influence of velocity.

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How Research Differs from Mill Control

C. QUINCY IVES, Vice President Research Associates, Inc.

▶▶▶ MANY SO-CALLED research departments are misnamed. There is a vast difference between the laboratory situated in a paper mill, the function of which is largely one of control of mill run, and a creative branch of the business. A good many mill managers and executives feel that if they provide the latest in equipment—modern to the nth degree—and employ experienced, high quality chemists and technicians, they have launched their individual corporation upon a research program, from which they are sure to get results.

As a matter of fact, such a laboratory probably will smooth out many of the rough spots in the production line by reason of its perfect control of both physical and chemical properties of the papers being manufactured, and thereby lull management into the erroneous belief that because the business is running along smoothly, its research department is clicking.

The true research department never runs smoothly; it never is satisfied; it never feels that the ultimate in perfection has been reached, for its very right to the title Research indicates an attitude of continuous searching—and researching.

In approaching a subject, the researcher does not start with the mill, its equipment, its personnel or its ability under its present standards to do any certain thing. These considerations come later when it is a part of the job to adapt such equipment and personnel to the manufacture of a product that is new and one which will meet a need—one that will be salable. The mechanical equipment in a real research laboratory is used to *evaluate* findings, not just to *find* them.

After almost thirty years of practical research, the author has learned that some of the cleverest chemists and technicians—wizards in getting the ultimate from equipment and keeping a product to a hairline of perfection—do not have those qualities so essential in the true researcher: (1) vision, an ability to observe and to make good use of such observations; (2) a dissatisfied mind, that of a doubting Thomas where published literature is concerned.

The practical researcher is not necessarily a college man. In fact, there are hundreds of very useful products which were conceived by men and women who never saw the inside of a university. An old university professor friend of mine used to say that only about forty per cent of the boys who came to college should have come at all, and of those who did attend only about ten per cent got the ultimate from their studies. That was his way of saying that the world is full of coypists; it is the minority who does its own thinking, using the literature merely as the guide to what is already known and has gone before.

Experience has proved that in about 98 times out of 100, the way a thing is being done now is, so far as is known, the best way to do it. But also it is invariably true that the two per cent is *always* there to be found, if we look hard enough.

In the mill control laboratory, there isn't time to stop and think. The mill must go on, paper must be made, there must be no hitch to standardized production. This procedure is as it should be, but it isn't any part of true research. In fact, it will be pure chance if a new product which will pass all the tests of continued use will come out of such a laboratory.

In almost any manufacturing plant hiring a number of skilled workmen there are a few persons who are potentially research minded. They may have no training along research lines, but instinctively they *see* possibilities, new uses, new ways and practical applications for either bettering the product they are making or for creating a radically new and improved product. Such workers should be sought out and given an opportunity to use their ability to the best advantage of their employer.

Some of them may be backward about expressing themselves; they are afraid they will be laughed at or told to stick to their daily job, etc. Good management, however, will seek out such employees by every means in its power.

Usually it is a pretty good idea to offer a reward for ideas submitted to the firm, but it is essential that it be a personal appeal, without fanfare or brass band tactics. Most men who have a gift of creation do not like too much publicity. They do, however, like the rewards that may come from their offerings.

Some men cannot write out their

(Turn to page 1452)

Multiple Generator Power

for Sectional Paper Machine Drive

G. E. PLAISTED, Application Engineer
Paper and Textile Division, General Electric Company

▶▶▶ THE PAPER INDUSTRY in the United States is a three-billion-dollar enterprise, employing nearly one-half a million people and producing approximately eighteen million tons of paper and paperboard annually. Another three and one-half million tons are imported. The grand total indicates that paper is provided in these United States at the rate of three hundred pounds per capita. This is many times the usage in any other country in the world.

Obviously a three billion-dollar industry deserves the best production equipment that engineering science can devise. If the use of paper and paper products is an index of civilization's development, then the improvement in production equipment is a measure of the engineering progress.

The fundamentals of paper manufacture have not changed over a period of many years, but to keep up with the increasing demands of production and quality, speeds have increased, paper sheet widths have increased, and their associated problems have become more complicated. To recognize these problems, it is necessary to understand the performance requirements of a paper machine and consider the shortcomings of existing equipment. To solve these problems, the shortcomings must be eliminated. Consequently, this discussion will cover:

1) The arrangement and performance of a paper machine
2) The types of drive that have been used, and their disadvantages
3) The multiple generator type of drive and its advantages

What Is a Paper Machine? What Does It Do?

A paper machine is really a *number* of machines that must be operated as a group, each having a definite function and each having a definite relation to the other. There are many variations of groups as dictated by the type or grade of paper to be produced. Fundamentally, they all perform the same function:

1) Depositing a layer of hydrated cellulose fibers on a wire screen of fine mesh
2) Sucking or pressing the water out of the mixture, leaving only the fibers in sheet form
3) Drying the fibers or the sheet
4) Surfacing the sheet and reeling it into a roll

This article will be limited to a fourdrinier machine (Figure 1) which consists of:

1) A couch or wire section
2) One or more presses
3) A group of series or nest of dryers
4) One or more calenders
5) Reel

Figure 1, developed from an architect's drawing, indicates the relative physical size of the complete grouping and shows the machine from the "front" or "tending" side. It is called the tending side because it is from this side that the papermakers observe the performance of the machine and determine when adjustments are necessary. The opposite side is the "back" side, the side to which mechanical power connections are made.

The preparation of the mixture of cellulose fibers and water (called stock) will not be discussed at length in this article. However, it is a series of hydraulic thermal, chemical, and mechanical processes, so varied that, when finally delivered to the head box at the couch or wire section, it is suitable for the production of the desired grade of paper. As delivered to the head box, the stock is approximately 99½ per cent water and one-half per cent fiber.

The couch or wire section consists of an endless belt of wire screen (60 to 80 mesh usually), of a width according to the width of paper desired, supported at each end by rolls, one of which is driven. This wire rides on smaller rolls to keep it flat, is kept taut by tightening rolls on the lower side, and "shaken," or given a vibrating movement, at right angles to the direction of travel of the wire. Stock is fed onto the wire from the head box through a gate (commonly called a slice). The volume of flow of stock onto the wire and the speed of the wire determine the final thickness or weight of paper from a particular consistency of stock, and the "shake" motion causes the fibers to arrange themselves in an interlacing manner to form the sheet.

The various machines or sections that make up the group, or the entire paper machine may be more clearly visualized by referring to Figure 2. As the stock is carried along by the wire, some of the water drains through the mesh by gravity and some is removed through the suction boxes over which the wire passes. By the time the stock has reached the couch roll, enough water has been removed to form a sheet with a consistency not unlike that of a very wet blotter.

From the couch roll the sheet is transferred to the first press section. The presses accomplish the function their name implies. They press the sheet, squeeze more water out, and thus further form and surface it. As the sheet passes from the first press to succeeding presses and to the dryers, its strength is gradually increased as the percentage of water content is reduced. Each section—couch, press, dryer, etc.—is a separate unit and between sections the paper is self-supporting. As water is removed, the paper stretches. To compensate for this stretch, each succeeding section must operate at a higher speed in feet per minute than the preceding one. Figure 2 indicates a certain percentage draw between each section. The percentage value or amount of draw is that amount by which the succeeding section speed is increased over the preceding one. This value varies with type, weight, and speed of paper as well as pressure on the press rolls. Constant weight of paper can be maintained only if the consistency of the stock and the speed of the machine remains constant, but a continuous sheet of paper can be maintained only if the draw is correct. Too much draw (succeeding section running too fast) will impose too much tension and tear the sheet; too little draw will permit slack between sections, resulting in wrinkles or perhaps tears because of looping. For quality product, both the over-all speed and correct draw must be maintained.

From the presses the sheet is fed around steam heated dryers (Figure 2). The dryers are drums, around which the sheet is passed to further dry it. The number of dryer rolls used is dependent upon the amount of drying or amount of water to be removed from the sheet. The dryer rolls are geared together, or are geared in groups according to the number of rolls used, and each group is a machine in itself with some draw between each group.

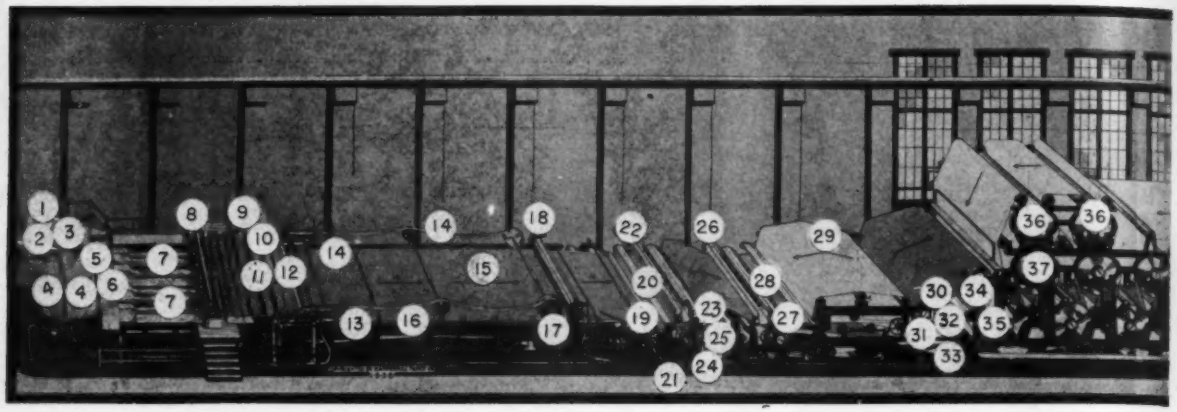


Figure 1—(Drawing copyrighted by Hammermill Paper Co. Reproduced by permission)

1. *Regulating box*
2. *Pulp*
3. *Water*
4. *Sand trap*
5. *Drain plug*
6. *Distribution trough*
7. *Screens*
8. *Collecting trough*
9. *Head box*
10. *Spray to eliminate foam*
11. *Pulp carried by apron*
12. *Slice or dam*
13. *Shaking mechanism*
14. *Deckle strap regulates width of sheet*
15. *Pulp carried by Fourdrinier wire*
16. *Wire carrying rolls*
17. *Flat suction boxes*
18. *Dandy rolls*
19. *Suction roll*
20. *Sheet carried by first felt*
21. *To vacuum pump*
22. *Doctor*
23. *First press*
24. *Suction roll*
25. *Watermarking*
26. *Doctor*

From the dryers the paper is fed to one or more calender stacks (Figure 2). These are hard surfaced rolls with extremely heavy pressure to surface the paper. The reel follows the calender and on it the paper (now reduced to from 5 to 10 per cent water) is formed into a roll ready for subsequent finishing or processing.

Thus, it is explained that a paper machine is in reality a group of machines that must operate in a definite relation, one with the other. In so doing it *does* remove water from a mixture of cellulose fiber and water to form a sheet of paper.

Types of Drives That Have Been Used

There are two distinct types of drives that have been used: (1) Line shaft drive (Figure 2), (2) sectional drive (Figure 3).

Obviously, the inviolate requirement of any type of drive is to maintain constant machine speed and correct draw (speed relation) between sections. The correct draw must be maintained at any point within the designed speed range of the machine. Speed range is designed into the machine to aid in making different weights of paper on the same machine.

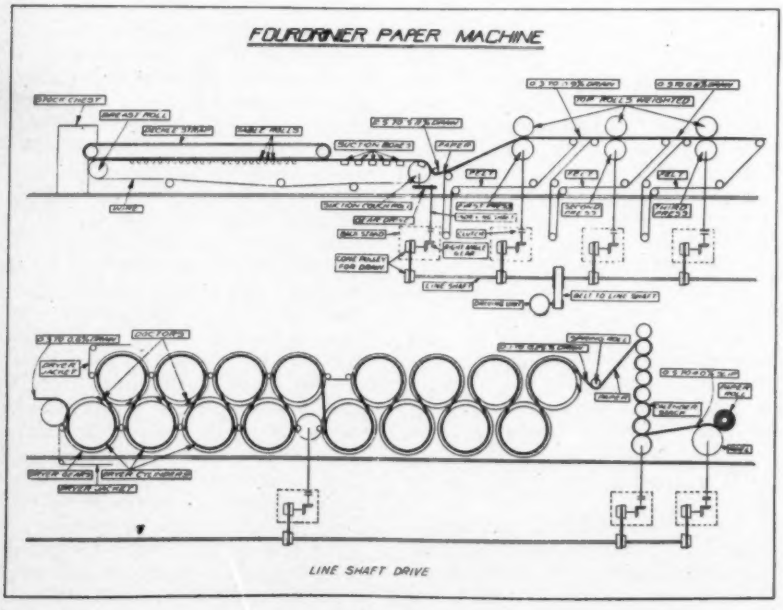


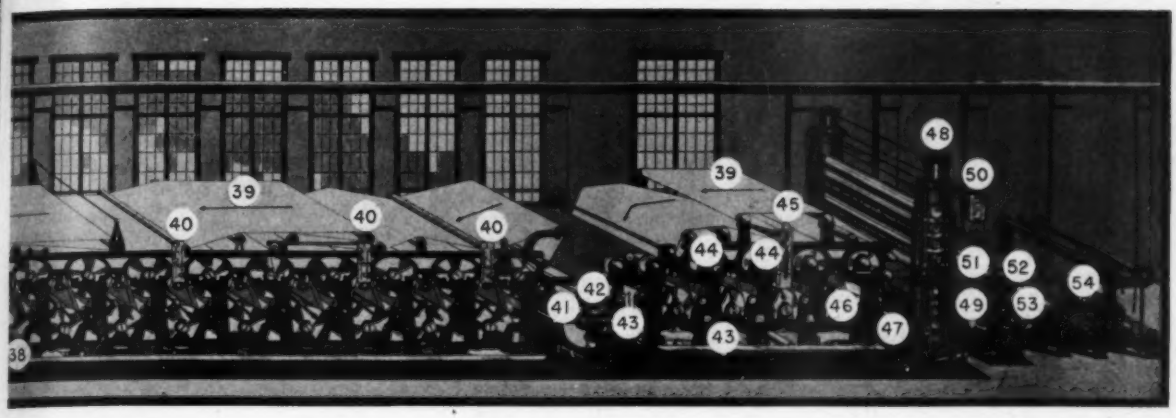
Figure 2

At different speeds the draw may be different; therefore, the draw must be adjustable. Some of the sections, particularly the dryers, have very heavy inertia. Therefore, to accelerate the machine requires either a large amount of power, or a long time. Since it is necessary to inspect each section occasionally, it is essential to provide means for stopping any section without stopping the complete machine.

Line Shaft Drive

This is being considered first because it was the earliest type of drive (Figure 2). As a means of driving the shaft, a waterwheel, a steam turbine, a gas engine, a steam engine, or an electric motor was used. The driving unit was direct coupled, belted, or geared to the line shaft. Usually, both the driving unit and the line shaft are located on the floor below the paper machine, and at each section a cone pulley may be assembled on the line shaft to be connected to a mating pulley on the back stand. The back stand is so named because it is on the back side of the machine and is a stand or group of equipment including the section in driving shaft with cone pulley, right angle gearing, and clutch for connecting or disconnecting power to the section. This grouping of equipment is repeated at each section.

To operate this type of drive, the power unit with line shaft is started and then the section clutches are engaged to start the sections. Obviously, as each clutch is engaged a shock load is applied to the drive. The over-all speed of the drive can be controlled only within the limits of the speed governor of the driving unit. Engi-



27. Second press
28. Sheet carried by second felt
29. Third felt returning
30. Doctor
31. Third press
32. Sheet carried by third felt
33. Second felt returning
34. Smoothing press
35. First dryer
36. Felt dryer
37. Second dryer
38. Bottom dryer felt returning
39. Top dryer felt returning
40. Steam regulators
41. Size liquid
42. Surface sizing press
43. Bottom dryer felt
44. Dryers
45. Steam regulator
46. Dryer
47. Air cooling pipes for calender rolls
48. Calenders
49. Paper winding on revolving reel
50. Moisture content control box
51. Empty reel ready for winding
52. Slitter cutting paper for two size rolls
53. Full reel rewinding
54. Rolls wound on iron cores ready to be cut into sheets

neering science has contributed much to the improvement of these governors or speed regulators. Draw is adjusted by mechanically shifting the belts on the cone pulleys. Belt slip must be kept at a minimum to obtain positive speed, particularly with load changes. Maintenance of these belt drives becomes a very important item.

The line shaft with its cone pulleys, right angle gears, and clutches, all being heavy and thus requiring much space and considerable maintenance, provides a drive adequate to make paper.

Sectional Motor Drive

To keep pace with the increasing production demands of the industry, it was necessary to redesign paper machines for greater output. The question was whether to make them wider or to run them at higher speed. Line shaft drives, because of their mechanical limitations, were not suitable for higher speed. The development of the sectional motor drive, which does not require the mechanical devices such as belts, cone pulleys, and clutches, was advanced because it would permit higher speed operation. Figure 3 shows the arrangement of units with a separate motor for driving each section of the machine. One generator furnishes power to all of the motors. The generator voltage is maintained constant by an accurate voltage regulator. A speed regulator, by varying the motor field, compensates for load changes on the section and holds the motor speed constant and in proper relation to the other section speeds. The speed regulator has gone through many stages of improvement. The regulator used today includes amplidynes with electronic amplifier, as shown in Figure 4.

To satisfy the requirements of the paper machine as outlined previously, the drive must make provision for:

1) Starting or stopping each section individually for wash-up or inspection

2) Changing the over-all speed of the complete machine

3) Adjusting and maintaining draw between sections

4) Maintaining constant over-all speed of machine to produce constant weight of paper

Constant over-all speed is maintained partly by providing a constant voltage to the motor armatures and partly by adjusting the motor field as the speed varies because of load changes on the section. To accomplish this, a separate reference voltage is established and a portion of it is applied to the voltage element of the generator voltage regulator. If there is a difference between that portion of the reference voltage used and the generated voltage, a change in excitation is made to return the generated voltage to that demanded by the reference. The amount of reference voltage selected determines the value of generator voltage

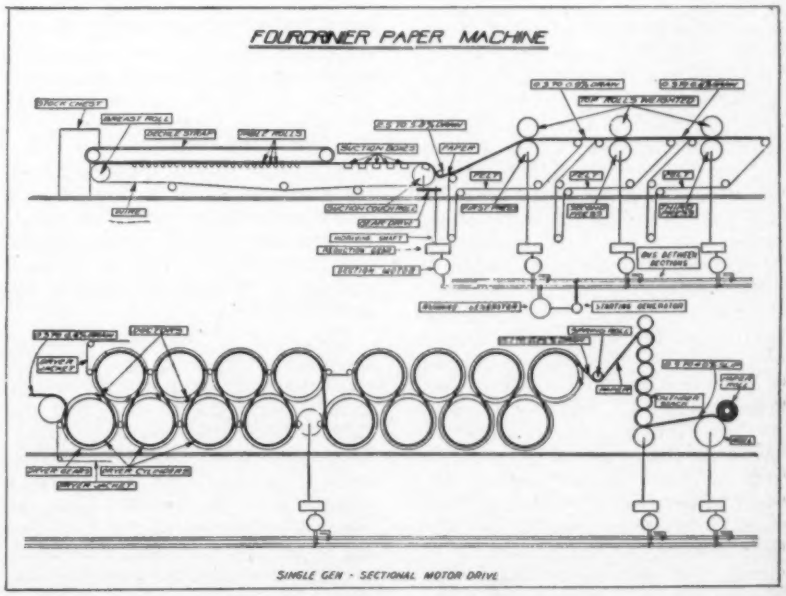


Figure 3

to be held. A change in the amount of reference voltage will change the over-all speed of the machine. Similarly, a portion of the reference is compared with a voltage generated by a pilot generator that is direct connected to each section motor. As the speed tends to vary because of load changes, the voltage generated by the pilot tends to change, resulting in a voltage

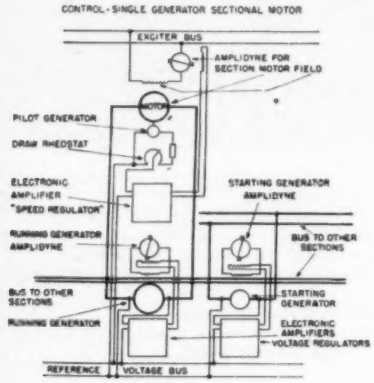


Figure 4

difference between it and the reference. This difference furnishes the signal to demand a change in motor field to correct the speed.

The motor speed can be varied, within designed limits, to adjust the draw by varying the amount of pilot voltage used to compare with the reference. This variation is accomplished by a small hand-operated rheostat called a draw rheostat.

Means for starting or stopping each section can be accomplished by starting resistors for each motor but this requires large grids, and because of the magnitude of the starting current of a heavy inertia dryer section, the generator itself might have to be increased in size. Instead of starting resistors, a separate generator is provided for starting duty only. It is a short time rated unit, capable of starting and accelerating the largest section. It will accelerate each section to that point where its armature voltage is the same as the running generator voltage and then the section motor is transferred to the running generator.

Thus have been provided the four main requirements previously named: (1) Independent starting and stopping of each section; (2) over-all machine speed change; (3) draw adjustment; (4) constant speed. There are several particular design points to be considered. A paper machine requires constant torque over its speed range. The speed is reduced by reducing the reference voltage. As this reference is reduced, the generator voltage is decreased in direct proportion. Unfortunately, the motor speed with constant torque requirements does not decrease in direct proportion to the voltage applied to its armature but is proportional to the voltage minus the IR drop (E-IR) or (cemf).

The various sections of a paper machine each have different power requirements and, therefore, their motors have different ratings and different IR drop. As the generator voltage decreases, the speeds of all motors do not decrease in the same proportion. The motor with the lowest IR drop decreases the least; the motor with the highest IR drop decreases the most. As an example, consider the largest motor with an IR drop of six volts and the smallest with an IR drop of 15 volts. Curve "A" of Figure 5 indicates the change of generator voltage with speed change requirements of motor with lowest IR drop. Curve "B" indicates resulting change in speed of motor with highest IR drop. The field of both motors is constant. The slope of "A" and "B" is determined by the IR drop. In this instance, at 20 per cent speed of the large motor only 16.9 per cent speed is obtained on the small motor. To increase the speed of the small motor to 20 per cent the field flux must be decreased 15.5 per cent. The torque is proportional to the product of field flux and armature current. Thus if the field flux is decreased 15.5 per cent, the armature current must be increased 18.5 per cent to maintain constant torque. Such a demand for increased current will result in greater IR drop, lower cemf, less flux and may even mean that the required torque cannot be obtained. Obviously, such an increase requires that a larger motor must be used than is normally required for the top speed power. A larger motor means more cost.

To maintain the draw and to correct for any speed variation due to load change, the speed regulator provides for weakening the motor field to increase the speed. With constant armature voltage, only an increased load can cause the speed to drop. If the field is weakened to correct the speed, the torque per ampere is actually reduced, yet there is a demand for more torque. As a result, the current demand is increased.

The range of the speed regulator also must be considered. At maximum speed the regulator must take care of speed increase due to draw and the speed variation due to load change. The motor speed regulation is very small. Therefore, the field current change is low. At minimum speed the regulator must reduce the field flux the 35 per cent previously mentioned, plus the draw, plus the speed variation due to load changes, and at low speed the regulation is quite high. At the low speed, then, the field current change is very high. The speed regulator must maintain the speed with the same degree of accuracy over this wide range.

With a running and a starting generator, all of the control panels themselves must be in line and are interconnected with a heavy bus structure to feed each section panel. Interlocking of panels is required to prevent an attempt to start more than one section at a time. Panels are required as follows:

1) Exciter and reference voltage
2) Running generator and voltage regulator
3) Starting generator and voltage regulator
4) One for each section

This type of sectional drive is in use today and offers the type of control and operation required to produce a quality product. It does require the derating of motors; it does require panels interconnected with bus structure and interlocked with control devices and wires; it does require a wide

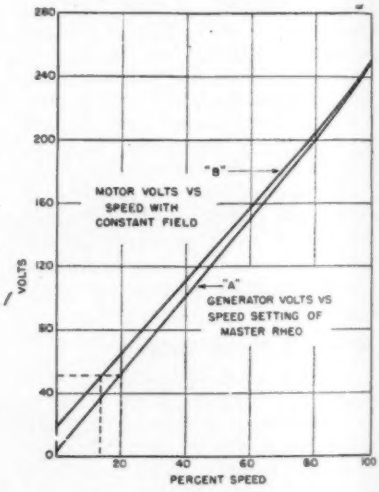


Figure 5

range speed regulator, and with speed regulator acting on motor field, it corrects speed at the sacrifice of torque (i.e., requires that larger motors be used).

Multiple Generator Sectional Drive

Paper machines are still being increased in width and designed for higher speed to increase production. More sections are being added to produce a better quality or a different grade of paper. The multiple generator drive provides all of the operating requirements of the other drives and overcomes the disadvantages mentioned. Instead of one running generator for the complete machine and a starting

generator for starting the sections, a separate generator is provided for each section (Figure 6). One panel only is required for each section. The running generator and starting generator panels are eliminated. Interconnecting bus structure between panels is not required. The panels do not have to be in line but can be installed at such individual spot as will require minimum cable run between motor and generator.

As in the single generator system, a reference voltage is established, but in this scheme it is compared directly with the voltage generated by the pilot on the sectional motor. Any voltage difference is used as a medium for changing the generator voltage. The speed then is maintained by generator voltage control with motor field remaining constant (Figure 7). As the load on the section changes, tending to change the speed, the pilot generator voltage varies directly in proportion to the speed and as it differs from the reference with which it is being compared, the regulator responds to change the generator voltage. The motor torque per ampere remains constant.

If the speed of the complete machine is to be changed, the amount of reference voltage used for comparison is changed. However, the comparison is still made between the reference and the voltage generated by the pilot, with the result that the generator voltage is reduced only that amount necessary to reduce the section motor speed to the desired value. Thus, the generator voltage now follows curve "B" of Figure 5, or it can be said that the generator voltage and motor speed are on the same curve. Therefore, again with this scheme of control, the motor torque per ampere remains constant, and it is unnecessary to derate motors. Motors of normal rating can be used, thereby reducing the motor cost. Not only is the cost reduced, but the motors are operated to better advantage by maintaining constant field flux resulting in a constant torque per ampere.

With multiple generators, as many sections can be started at once as the operator desires. There is no waiting for the starting generator to accelerate one section, transfer the section to the running generator, and return the starting generator voltage to the condition required to accelerate another section. Also, in starting sections with the multiple generator scheme, there is no possibility of shock to the system as transfer from one generator to another is not required. Each section drive is a separate and individual power system.

The required range of the speed regulator as discussed for the single generator system was much wider at low speeds. With the multiple system this is not needed. Because of the saturation of the generator, a greater field current change per volt is required at top speed than at low speed. The speed regulation of the motor is somewhat greater at low speed. Even so, the required generator field change for equivalent speed correction is less at low speed than at top speed, such that the regulator range is materially reduced. With the requirements of correction more nearly the same throughout the machine speed range, the regulator sensitivity will not vary as much. Therefore, improved performance results.

A master rheostat that varies the amount of reference voltage to be used to compare the voltages generated by the pilots on individual sections determines the over-all speed of the machine. A draw rheostat in the pilot generator circuit to determine the portion of its voltage to be used in the comparison circuit adjusts the draw. Thus, only the reference voltage circuit is interconnected between panels.

The elimination of the main generator and the starting generator also eliminates their respective voltage regulators. Their complete panels are eliminated together with the heavy bus structure that interconnects them with other panels. The multiple generator system makes each section an integral electrical system in itself. The electrical inspection, adjustment, and maintenance is thus simplified.

The development of the multiple generator system has, therefore, incorporated or improved all of the features of the other present systems of drive, as can be summarized as follows:

1) The heavy belts, cone pulleys, clutches, and associated mechanical parts required by a line shaft are eliminated.

2) Individual sections may be started or stopped without imposing either mechanical or electrical shock on the rest of the system.

3) Load change or speed correction of one section has no effect on the electrical system supplying the other sections.

4) Generator voltage is reduced only that amount necessary to reduce motor speed. Therefore, motors are not derated.

5) Motor speed correction is made by armature voltage control, thus maintaining constant torque per ampere.

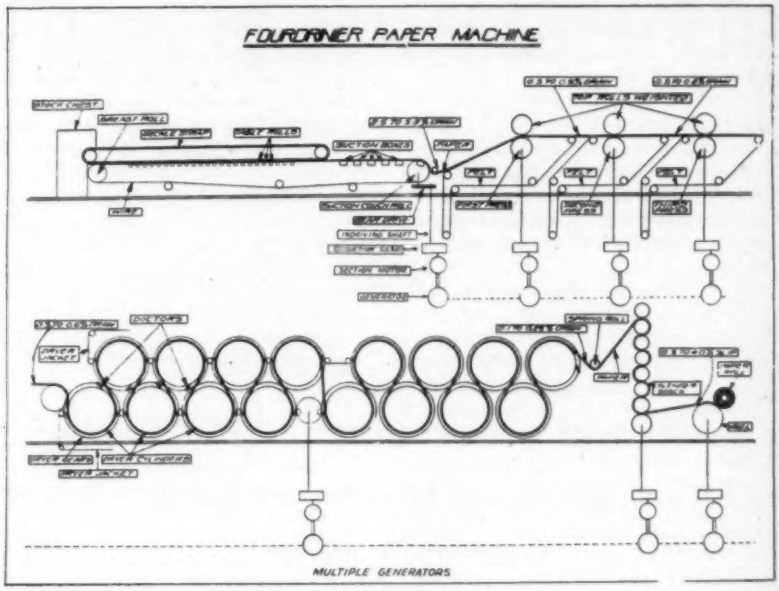


Figure 6

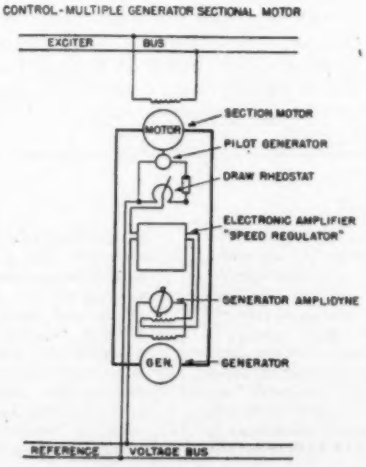


Figure 7

6) Range of regulator is more nearly the same at any speed, thereby permitting building into it adequate sensitivity at all speeds.

7) Two voltage regulators and two generator panels eliminated.

8) Only one panel for each section, without interconnected bus structure, and these panels can be isolated at spots economically situated for minimum cable run from generator to motor.

9) With individual panels each section is a simplified individual electrical system providing easier inspection, adjustment and maintenance.

Service experience is always the proving ground for any system. Although this discussion may be one of the first on this system, this arrangement is by no means new in the paper industry. There are two General Electric multiple generator drives now in operation, one having been installed in 1926, the other in 1929. Both are in the same mill where there are also single generator sectional motor drives. The multiple generator drives operate over a 10:1 speed range. Field reports prove both satisfactory performance and maintenance comparable with the single generator drives.

How Research Differs from Mill Control

(Continued from page 1446)

ideas. So it is often productive to set aside a time, and an understanding executive (and this is of primary importance), who will listen to such workers, sort out the good ideas from the bad, encourage the employees and make them feel that the very fact that they offer an idea is a step toward better relations between labor and management.

Just as an example: a young chap once came to the author with an idea for an attachment to a submarine. He knew nothing about drafting or higher mathematics, nor did he have the ability to write out his ideas. He wasn't even connected with any seafaring venture. He did have ideas, however, and only needed the right place to express them. It turned out that his idea, while extremely rough, had merit; and his device is now part of standard equipment on every submarine afloat.

No actual time limit can be put on creative work. A man may work a year and come up with nothing which can be put to practical use; then, in another month, he may produce a winner. Citing a personal experience, a number of years ago I was employed by a firm to develop something—it didn't know what, just as long as the product was something in its line. Whenever the president of the concern would meet me in the hall he would say, "Good morning! Have you invented anything yet"? That is about like saying, "Have you finished the job you are on? When can we expect delivery"?

It happened that after four months a product was developed which at this writing is the main product of the concern in question. This product outdistanced all other lines of the company by far, and has made a million-dollar concern out of the firm in only a few years.

Excellent authority has said that from two to five per cent of gross sales may very profitably be put aside for practical research. This means that the big fellow can afford long-term projects handled by a large staff of expensive personnel; but the little or medium-sized fellow must concentrate his efforts, must make the most of the brains already at hand, or, if he does have to go outside for help, see that such help is co-operative—willing to match its ability against the research fund limits of the manufacturer and to profit from the results obtained.

It has been said that research is a gamble, but to do no research is the greatest gamble of all. No matter what your business is, there can be some improvement in it. There are few people who do not or have not had the urge to invent something. Many persons don't know how to go about it. Others cannot carry through an idea to a successful conclusion. The untrained worker often spends too much time trying to think out an idea which from its basic standpoint is impractical and not needed, or is so far ahead of present day thinking that it becomes in the pure science class—an unproven theory.

A manufacturer who now has or contemplates a well-equipped laboratory should have in mind that its use as a control tower is one thing, and probably will show profit the quickest; but he should set aside a sum to be used solely for research. He should put someone (or more than one, if he can find the right brains) on the job and give him free rein—freedom from purely functional labor and a place in which to work, aside from the control force. Such a man should report directly to top management.

Creation is almost always the products of more than one brain. It is the intelligent collection of pertinent ideas from many persons, all of whom should receive their share of credit when success is achieved.

Management, therefore, should be on its toes to locate and segregate employees—or any other persons whose services may be available, having that type of inquiring mind coupled with knowledge and ability to assimilate quickly the necessary basic and fundamental facts for use in formulating practical ideas. Such men also must have the ability to get along with folks, to have no thought of the time clock and to put accomplishment ahead of everything. There are such men and women.

GUARANTEED INTELLIGENCE—

Montesquieu, who has handed to us the wisdom of free thought which has resolved into a way of life we know as democratic, made a statement of timeliness applicable to recent research developments. He has said that although man possesses brains and the power of thought that no guarantee of intelligence has been given. In Great Britain, men of science have created an artificial brain, "its implications so vast that we cannot conceive how it will affect our civilization." This research into artificial intelligence has resulted in a machine known as "Ace" capable of solving mathematical problems in a matter of seconds which the most acute human intelligence must labor upon for weeks; "Ace" possesses memory, and judgment, and choice. . . . The wisdom of Montesquieu echoes across the years. Research is the trade-mark of progress; it is the guarantee of man's grasp and hold upon his industry and his productive power; however, in this era of atomic power, is it possible to guarantee intelligence in the form of machined knowledge, when man's intelligence pales before the power so created? We need research and continuing scientific endeavor; we need, as well, a recalculation of human understanding which foretells no guarantee for wisdom.

Notes and Observations on BEATERS—Part II

B. M. BAXTER
Consulting Engineer

Horne Patent Beater

▶▶▶ INTRODUCED ABOUT 1885, the Horne Patent Beater differs radically from the Holland design. Its roll, commonly of greater width than diameter, is placed at one end of the tub in such a manner that the middle of the roll is on the center line of the tub. At a suitable distance ahead of the roll, the midfeather makes an angle to meet the side of the tub just ahead of the roll. This feature permits the stock to enter the roll all across the roll face. There is no backfall—instead, the stock passes entirely over the roll, discharging into a sharply inclined chute leading to the forward passage of the tub.

Although this beater possesses some distinct advantages and its use has been fairly general, the number built has not been great in proportion to the more nearly universal type.*

The "High Speed" Beater

The appelation "high speed" applies to the rate of travel of stock in the beater tub rather than to the roll speed. In most high speed beater installations, however, it has been customary to operate at roll speeds considerably higher than previously employed with conventional Holland beaters.

The first beater of distinctive high speed characteristics was introduced about 1918 by the Valley Iron Works Company. Designed by Ernst Mahler, of the Kimberly-Clark Corporation, this beater was called the "Niagara," presumably suggested because the first installation was made in the Niagara (Wis.) mill of Kimberly-Clark. The design reflected European beater developments.

The outstanding characteristics of the Niagara beater were great depth of tub, materially higher at the rear; sharply inclined bottom; high backfall; the roll deeply submerged in the stock; and a hollow midfeather—walling in the inside beater roll spindle bearing. Had the spindle extended entirely across the tub, as in a Holland breater, it would have interfered with the forward flow of the stock.

Because of the great draft of the tub, that is, excess of height at rear over front and steeply pitched floor, the Niagara beater gave very rapid travel to stock at densities much higher than possible in Holland beaters as built previously. Thus, one of the Niagara beaters would displace several Holland beaters. This advantage caused a considerable number of them to be installed.

High power requirements resulted from the usual employment of high roll speeds. At roll speeds frequently used, power consumption ran about three times that of a Holland beater of equal roll face. Yet, because of the high speed travel of the stock, and, therefore, increased contact of the fibers with roll and bedplate, the power consumption of the Niagara beater per ton of stock was not increased over the old Holland type beater.

The development of the Niagara beater showed up the deficiencies of the Holland design which, for nearly half a century, had been altered little except in improved mechanical construction.

Considerable attention, therefore, was given to the alteration of existing Holland beaters to secure rapid circulation at higher densities and more rapid beating. In some instances, alterations took the course of hollow midfeathers; cutting off the spindles and machining journals close to rolls to suit lighter bar and bearing assemblies installed in the midfeathers; increasing height of tubs; providing higher backfalls, doctors and curved deflector plates for delivery of the stock leaving the rolls over the crests of the high backfalls; and giving considerable pitch to tub bottoms.

In the usual alteration, the hollow midfeather was not adopted. Neither was any change made in the spindle. It was found that the spindle caused no practical restriction of the flow when the tub had been built up to such height that the spindle ran completely submerged.

Some of these alteration jobs were satisfactory; some fell short of entire satisfaction. Frequent faults of design were too great increase of tub height (especially at the front end), and lack of sufficient throat opening between backfall crest and deflector. The first of these faults caused excessive power consumption; the latter, plugging when furnishing sheet and roll pulp.

Figure 7, taken from the detail drawing of an actual alteration job, illustrates the last mentioned fault. The throat opening and distance from backfall crest to deflector are about one-half the necessary distances for

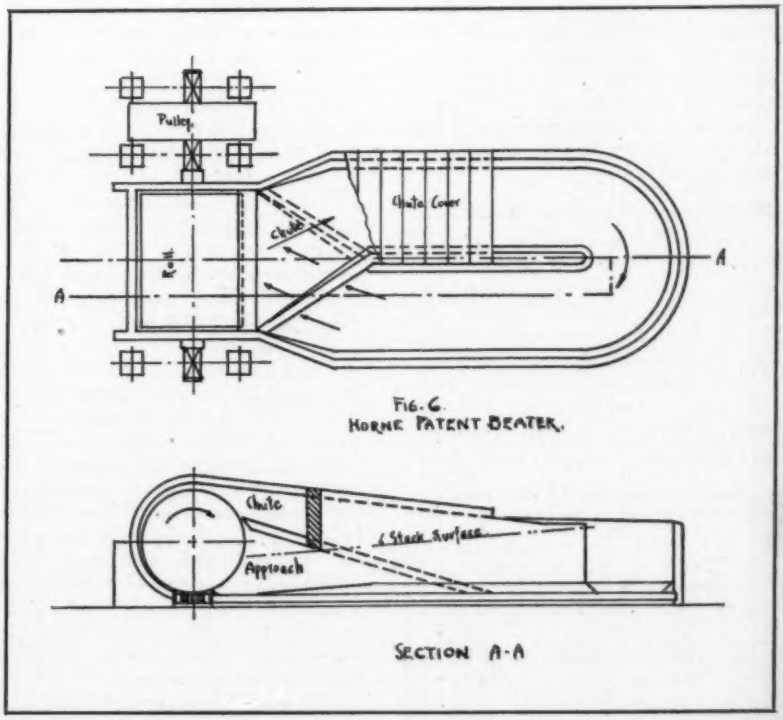
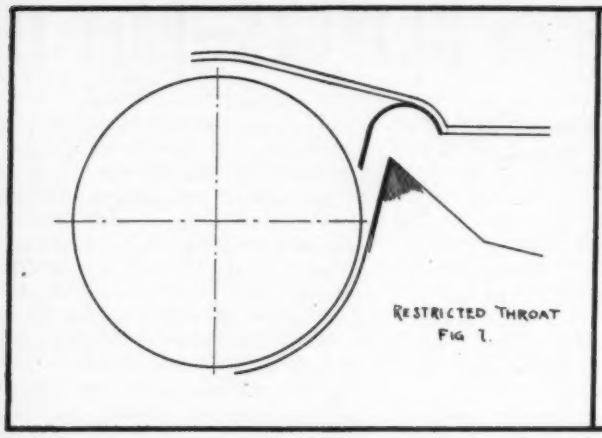
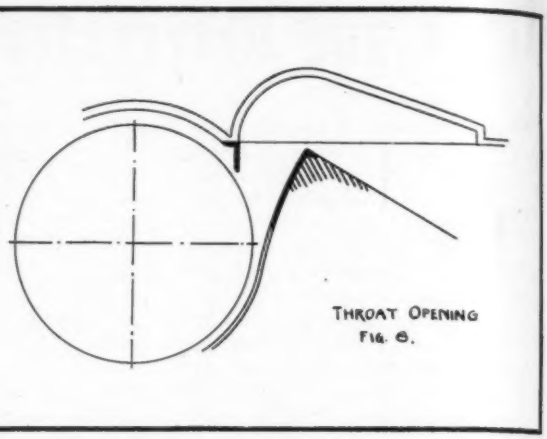


FIG. 6
HORNE PATENT BEATER.

(*) The Horne Patent beater was not the only beater product of J. H. Horne & Sons Company. A beater of the Holland type also was manufactured by this company. . . . A beater made by Emerson has the roll at the end as in the Horne, but it has two midfeathers which divide the tub into one central and two side channels.



RESTRICTED THROAT
FIG 7.



THROAT OPENING
FIG. 8.

satisfactory operation when furnishing sheet pulp. In contrast, Figure 8, shows an alteration made to convert an old beater for the intended purpose of breaking and bleaching sheet sulphite.

General proportions of altered Holland beaters giving satisfactory operation with moderate power consumption are about as follows:

Tub Height, front . . . 4 inches above center of roll

Tub Height, rear . . . One-third roll diameter above center of roll

Pitch of bottom . . . Three-quarters inch per foot of travel

Height of Backfall crest . . . One-quarter to one-third of roll diameter above center of roll

With these proportions and tub lengths as commonly found in Holland beaters, amply rapid travel is obtained with kraft stock at up to 7 per cent density; bleached sulphite, to 8 per cent; and mixed furnishes of deinked paper stock and sulphite in proportion of half each to 9 per cent—all on bone-dry basis.

Beater Size—Effect on Stock

Beater engineers and papermakers have often stated that small beaters make better stuff than large ones. However, on repeated inquiries, the author has never been able to obtain any logical reason for this superiority. Perhaps the reason is revealed in Table 1, entitled Holland Beaters—Roll Sizes and Capacities, and specifically in the column covering ratio of pounds capacity per inch of roll face (See Part I, December, 1946, issue). For example: The pounds capacity per inch of roll face for the 500-pound beater with 36-inch roll is twice that of the 1500-pound beater with 54-inch roll. Therefore, under similar operating conditions—such as density of stock, rapidity of travel, roll speed, roll pressure and kind and condition of tackle, the 500-pound beater will beat off its furnish in one-half the time required by the 1500-pound beater.

TABLE 2—Horne Patent Type Beaters

Capacity (Pounds)	Roll Dimensions (Inches)	Pounds Capacity Per Inch of Roll Face
1000	48x54	18.5
1200	54x60	20.0
1600	60x72	22.2

This conclusion is supported by the results obtained with beaters of laboratory size. Although the roll speeds of such beaters, expressed in feet per minute, are much lower than the surface speeds of rolls of mill beaters, they will beat off and refine stuff in a matter of fifteen to twenty minutes to a point equalling some four hours in a mill beater followed by the action of a well setup jordan.

Consider a laboratory beater of 5 pounds nominal capacity and having a roll with an 8-inch face. The ratio of pound capacity to inch of roll face is $\frac{5}{8}$ or 0.625. This ratio amply explains the very fast action of the laboratory beater in spite of such adverse factors as much lower roll speed, less pressure of roll on plate per inch of roll face, and lower stock density.

The influence of the capacity per inch roll face ratio may be emphasized by citing an actual experience. A well-known builder of beaters constructed a beater having a roll 36 inches in diameter and a face of 30 inches, and with a design capacity of 400 pounds. Later another beater was built for the same customer and service. This second beater had a roll 56 inches in diameter and 48 inches across the face. It was designed for a capacity of 1000 pounds. Actually, it was exactly a duplicate of the first beater except as to size.

The small beater actually held 500 pounds of stock; the larger one, 1200 pounds. The larger beater took $4\frac{1}{2}$ to 5 hours to beat to the same freeness test that was obtained in the small beater after 3 to $3\frac{1}{4}$ hours.

Applying the capacity-face ratio to these beaters, the figure for the same beater is 16.7 pounds per inch; that for the large beater, 25 pounds per inch. These figures reveal that the increased beating time of the larger beater is in direct proportion to the capacity-face ratios of the two beaters ($16.7:25::3:x = 4.5$ hours).

However, the lower ratio of the small beater is not the entire story. The time of treatment has an important effect on the character of the stuff. Increased time causes more hydration slowness. If beaten to the same shortness of fiber, the stuff made in the small beater will be more free; that made in the large beater, more slow.

If, in order to hasten beating and lessen hydration slowness, the roll of the 1500-pound beater is put down harder, the action will tend more to cut the fibers than to split and frazzle them.

It is not to be assumed that small beaters are better for all purposes. The fiber of some stocks and actual beat-

TABLE 3—Relation of Power to Roll Speed*

Roll Speed	Power by Curve	Power by Calculation
1285	0.515	0.495
1325	0.54	0.53
1375	0.57	0.57
1450	0.645	0.63
1520	0.705	0.695
1580	0.75	0.75
1655	0.825	0.825
1725	0.905	0.895
1795	0.99	0.97

*In making these calculations, a roll speed of 1655 ft. was used as a basis.

ing requirements may make heavy roll pressure on the bedplate necessary. In a case of this kind, small beaters with relatively light rolls and relatively low pressures of rolls on plate per inch of roll face, may be incapable of doing the necessary work.

Three general conclusions may be deduced:

1) The character of stuff produced in a beater is so greatly influenced by the size of beater that stuff of exactly comparable characteristics cannot be produced in large and small beaters alike.

2) If it is desired to produce a stuff that will form into a well-closed sheet and at the same time run free on the machine, from fiber which takes on hydration in the beater, the result will be accomplished best in a beater having a low ratio of pounds capacity per inch of roll face.

3) The net beating time, that is, the time from the initial lowering of the roll after completion of stock furnish to the raising of the roll before dumping, will be directly proportional to the capacity-roll face ratio, other conditions being alike.

Capacity-Face Ratio of Horne Patent Beater

If beaters with a low ratio of capacity to roll face are desirable in order to obtain desired sheet characteristics, and, if the installation of a great number of small beaters is objectionable, then beaters differing in design from the familiar Holland type must be used. These beaters must be of such design as to hold the required amount of stock and also have roll face widths to give ratios of capacity to roll width that would be comparable with small Hollander beaters. The Horne Patent beater, the Umpherston, and the Emerson are three such beaters.

Capacity-face ratios of a few sizes of Horne Patent type beaters are given in Table 2.

These ratios, especially in the larger sizes, are considerably lower than ratios of Holland beaters of comparable capacity. Such beaters, therefore, could be considered faster in beating, and actual experience bears it out.

Another advantage of this type of beater (Figure 6) is that more bar length can be installed in a given length of floor. The proportion is about as four to three. In other words, four such beaters with a 60-inch roll face can be installed in the same space as three Holland beaters with the same roll face. Sometimes this advantage may be of considerable value.

TABLE 4—Power Consumption with Dimensional and Operating Data of a Beater*

Roll diameter (mm.)	1350	(53 in.)
Roll face (mm.)	1150	(45.2 in.)
Roll weight, inc. spindle (kg.)	3715	(8170 lb.)
Tub capacity (liters)	3700	
Furnish weight (kg.)	285	(625 lb.)
Density (per cent)	7.7	
Roll speed (rpm)	127	
Roll speed (fpm)	1760	
Roll pressure on plate (kg.)	1645	(3620 lb.)
Power consumption:		
Maximum hp.	42.9	
Minimum hp.	38.5	
Average, 6 readings	40.2	

*Presumably German, as reported by Dr. Sigurd Smith.

A further advantage, although of relatively less importance, is in the shorter shaft or spindle. When minimum weight is a consideration, the shorter shaft allows sound construction with somewhat less weight proportional to roll face.

Power

The cost of power for beater operation is one of the large items in the cost of preparation of stock. In some instances, it may be the largest single item. Even with a low unit cost, the cost of power per beater may range from $1500 per year for a moderately small, well-designed beater, operating at an economical roll speed to $5,000, or even more, for a larger beater with too deep a tub, driven at a high roll speed. While power economy should not be sought at the expense of poor stock preparation, efficient management demands consideration of all costs. It also is a fact that roll speeds

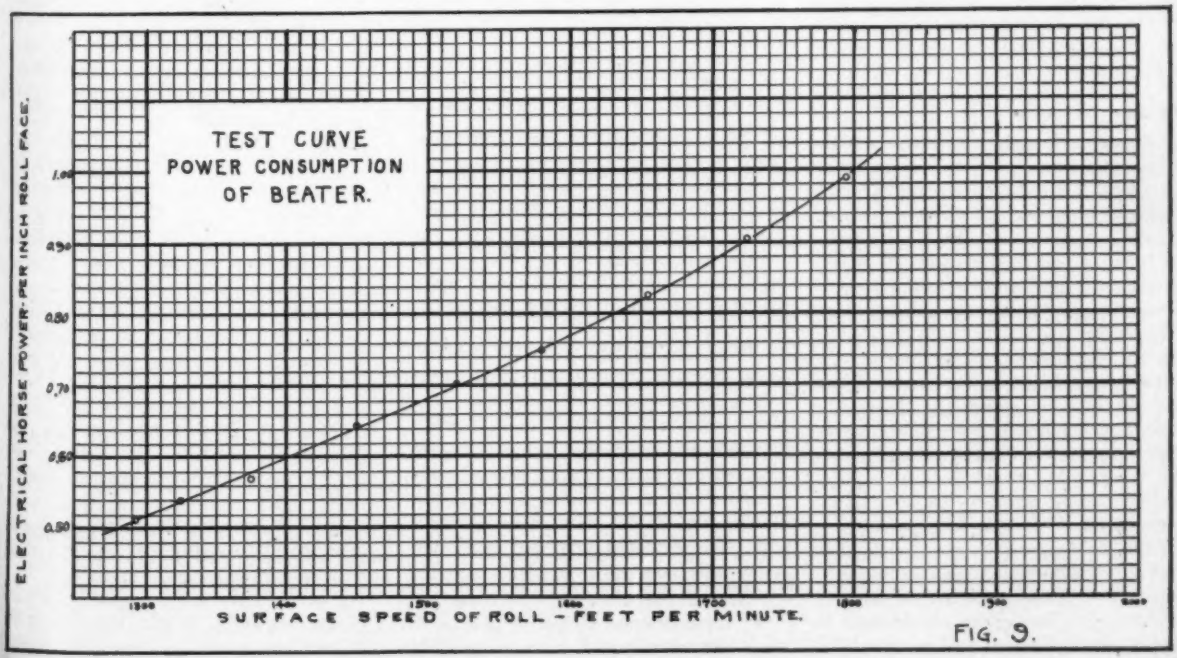


FIG. 9.

which result in economical use of power usually produce the best stock.

Within the author's knowledge, there has never been any satisfactory method for estimating in advance the power required for beater operation. A rough rule of one horsepower per inch of roll face may lead to very serious errors. In the case of a 54-inch face roll, operating at moderate speed in a tub of economical depth, a 50-hp. motor may be ample under all conditions. On the other hand, a beater still having a 54-inch face roll, but driven at high speed and having a deep tub, may burn up 100-hp. motors.

Power increases very materially with reduction in density. A beater furnished with water only with roll up, will take more power than when furnished. It will take as much or more than when furnished and with the roll lowered to a light to medium brush.

Power increases with rate of travel. Power increases with wider spacing of flybars. Power increases very rapidly and at a definite rate, with increased roll speed. Power goes up when wider flybars are used, also by increasing the depth from cutting edge to wood fillers.

These conditions are all more or less interrelated through having to do with rate of travel. The main part of the expenditure of power is in creating travel, only a relatively small part in actual work done in reducing fiber length.

Even when the roll is put down full weight on the bedplate, rarely, if ever, does the power increase more than 50 per cent over the power with roll up. Herein lies the basis for the claim of inherent inefficiency of the beater as a machine.

Power Formula

An older beater, rebuilt to a high speed type of moderate design, was employed in a test to find some rational and definite method of estimating power requirements. Built originally in 1886, the beater had a roll 40 inches in diameter and with a 36-inch face. Some time previously, the tub had been lengthened two feet at each end. Also, in the rebuilding of the beater, 16 inches were added to the height of the tub at the rear, nothing at the front; and a new and higher backfall was installed. Tub dimensions after rebuilding were: height at front—28 inches; height at rear—50 inches; inside length—22 feet, 6 inches.

The beater was driven by a 230-volt, direct-current variable speed motor. The furnish was all sulphite at a density estimated by observation as 6 per cent. The roll was set to a light brush on the bedplate and was not altered during the test. The only variation was in roll speed.

Nine power readings were taken at roll speeds varying from 1285 fpm surface speed to 1795 ft. The test results, with power expressed as electrical horsepower per inch roll face, are shown by the curve of Figure 9.

The curve shows that the power consumption increase with speed is quite uniform and regular, and that the power increases at a rate greater than the increase of speed. The rate of increase is almost exactly with the square of the speed. In fact, any point on the curve can be taken and the power for other speeds calculated from the reading. The ratios of the squares of the speed are found to agree very closely with the actual power.

To check comparison of test results with the observation relating to power varying with the square of the speed, Table 3 was calculated. In making the calculations, a roll speed of 1655 ft. was used as a basis.

Because of the remarkable agreement of the test points with calculated comparison, a formula was evolved from the data for the power consumption of beaters. The formula is:

$$\text{Horsepower} = \frac{K \times W \times S^2}{10{,}000{,}000}$$

In this formula, K is a constant dependent upon design. W is the width of the roll, or flybar length, in inches. S is the roll speed in feet per minute.

Subsequent investigation of the driving power of beaters in actual service under usual mill conditions resulted in setting the following values of the constant K.

Horne Patent Beaters	2.8
Holland Beaters	3.5
High-Speed Deep Tub	4.5

The formula, using these constants, was checked against the actual power consumption of a considerable number of beaters. It was found to agree quite closely in every case. With due regard to character of stock and beating requirements, it can be used safely in the selection of motors. In selecting a motor, if the roll is to be run full weight on the bedplate, add 50 per cent to the figure obtained by the formula for safe maximum power consumption. If the roll is to be run down full weight for a period not to exceed one hour, add 25 per cent instead of 50 per cent. Any good motor will carry 25 per cent over rating for one hour without reaching maximum allowable temperature.

Several Horne beaters, each with a roll 54 inches in diameter and with a 60-inch face and each individually driven with a synchronous motor, were studied. The roll speed of these beaters was 120 rpm or about 1700 fpm face speed.

With the rolls down full weight, the journals of the spindles slack in the bearings, and the fields of the motors adjusted to unity power factor, each of these beaters took 75 amperes at 440 volts (three phase), in other words, 57.1 kw. or 76.5 electrical horsepower. This power consumption is 157 per cent greater than would be calculated from the formula with K as 2.8. In this case, K would have a value of 4.4 for rolls down full weight.

The beaters in this study were treating bleached sulphite at a density on a bone-dry basis, of about 7 per cent. Actual density tests gave figures of 6.75 to 6.88. At these densities, the travel speed increased as the stock became slower. The range of travel was from 27 fpm to 41.5 feet. This latter figure was considerably more than needed for full fibrage formation.

Another group of Horne Patent beaters, with the rolls down full weight, took 85 hp. each. In this case, the rolls were 60 inches in diameter and had a 72-inch face. They were running at 1710 feet face speed per minute. Calculating K for this operation gives a figure of 4.02.

Running with a fairly light brush, the same beaters showed a power consumption of 60 hp. for which K is 2.84.

In another case, the formula was found to hold true for beaters that were running at speeds up to 2400 feet. Calculated savings in power resulted when the beaters were slowed down to 1600 feet.

Applying data of Table 4 to the formula for power consumption gives K a value of 3.0. However, the power figures presumably are metric horse power, thus requiring a multiplier of 1.1. Also, the power is reported as motor output rather than input. If the efficiency of the motor is taken as 90 per cent, the value of K, both factors considered, becomes 3.66.

Compared with beaters as commonly found in this country, the capacity of this beater is small, in proportion to its roll dimensions. Also, the roll is relatively light.

The capacity indicates a relatively shallow tub. Therefore, although the density is rather high, the beater would not classify as a deep-tub, high-speed beater. Because of this fact, its power constant should be comparable to that assigned to Holland beaters.

The formula gives power in terms of current input to the motor, while motors are rated in terms of shaft

horse power output. Accordingly, there is a margin of safety in the application of the formula, if its indications are taken as motor rating, to the extent of motor efficiency. This efficiency may be about 88 per cent for induction motors and 92 per cent for synchronous. Where the formula indicates a 100-hp. load, the actual load, as motors are rated, would be about 90 hp.

The mill engineer is interested primarily in the cost of operation. This cost is a matter of current consumed, rather than of power delivered to the shaft of a motor. Therefore, the formula is based on current input rather than motor output.

That the power should increase with the square of the speed is entirely logical. Journal friction, of course, should increase directly with the speed and not with the square. This friction, however, is a small part of the total power. Also, it decreases as the pressure of the roll on the bedplate reduces the load on the bearings.

If the amount of fiber carried across the cutting edges was the same at different speeds, the power consumed in actually cutting the fiber should vary directly with the speed and not with the square. Actually, the fibrage decreases with increased speed. Accordingly, this element of power consumption should increase less rapidly than directly with the speed. The great consumption of power is in shock due to impact of the bars on the stock.

TABLE 5—Relation of Roll Speed Increase to Power Increase

Roll Speed Increase (per cent)	Power Increase (per cent)
10	21
20	44
30	69
40	96

It is well known in mechanics and hydraulics that the energy absorbed in shock increases with the square of the relative velocities. The quantity of stock circulated also increases somewhat with the speed of the roll. If the quantity circulated increased directly with the speed, the power absorbed in shock would increase with the cube of the speed.

The fact that the shock loss increases more rapidly than with the square of the speed is enough to account for other losses increasing at a rate less than the square. The net effect is that total power increases with the square.

Table 5 illustrates more concisely the effect of speed on power.

EDITOR'S NOTE: Part I of this series by Mr. Baxter appeared in the December, 1946, issue of this magazine. Further installments will appear in subsequent issues.

Comments Direct from the Foremen

▶▶▶ FOREMEN WANT MORE of a hand in management transactions with unions, a survey made by the National Foremen's Institute, Deep River, Connecticut, reveals.

The Institute polled 1,000 foremen in more than twenty industries and found that the majority of supervisors take little or no part in company relations with organized labor.

They were asked this question: "Which duties should be assigned to you so that you could do a better job"? Seventeen per cent of the foremen and supervisors, proposing additional duties for themselves, ask to join in union contract negotiations. Twenty per cent want something to say about the related matter of wage rates. Ten per cent would like the responsibility for dealing with union shop stewards and another ten per cent ask for the job of handling employee grievances, which frequently become union matters in organized plants, shops and offices.

The growing interest of foremen in company policies on labor relations is one finding of the survey which the National Foremen's Institute is distributing as "A Report On Foremanship Attitudes." Other findings show the present duties and responsibilities of foremen as they reported them to the Institute, the ways in which they think top management should improve their status, and the types of information and training foremen seek in order to do their jobs better.

Their comments on the news and training materials they read in *The Foreman's Letter*, an information service mailed by the Institute every two weeks to foremen in all types of industry, indicate that many foremen have a sincere desire to get accurate and objective news on labor and union matters, but only a few comments suggest a desire for information on foremen unions.

The report stresses the fact that when foremen were asked what improvements they thought would be of mutual benefit to themselves and their employers, 55 per cent of those replying said they needed clarification of their responsibility and authority and 41 per cent wanted to learn the principles of personnel relations.

On the basis of these percentages, the report states: "The most important point suggested by the response is that every employer should make it his business to find out just what his foremen's replies would be to the type of questions raised in the opinion poll of the National Foremen's Institute. To know what foremen have in mind and to be aware of their wishes and complaints is a much more helpful and productive starting point than to know all the arguments against the unionization of foremen."

One part of the poll, dealing with the characteristics of industry's present supervisory force, indicates that the return of veterans and postwar retirement of older foremen have lowered the average age of foremen. Fifty-nine per cent of the foremen are now between 30 and 45 years old. Previous polls showed the majority to be between 40 and 60 years of age.

Factors Affecting The Opacity of Coated Papers

WILLIAM R. WILLETS
Titanium Pigment Corporation

▶▶▶ WHILE THE BRIGHTNESS of coated papers always has been and still is an important characteristic, prior to the war opacity was usually satisfactory because most coated papers were so heavy as to be inherently opaque. However, new coating processes coupled with demands for lightweight, coated papers have made opacity as important a consideration as brightness.

It is a well-known fact that the brightness of a coated sheet of paper is dependent on a number of variables such as the brightness and covering power of the coating pigment as determined by the coating formula, the brightness of the raw stock, the weight of coating applied, calendering, etc., and the effect of some of these factors has been discussed in the literature ("The Brightness of Coated Papers," *The American Pulp and Paper Mill Superintendents Year Book*, 1945, Pages 181, etc.). It is obvious that analogous factors would also apply to the opacity of coated papers.

For example, the opacity of a coated paper will depend on the opacity of the raw stock used. The opacity of raw stocks varies greatly and is determined by the furnish, processing, and weight. Groundwood raw stocks tend to be more opaque than woodfree raw stocks partly because of the "fines" present and partly because they usually are duller. Raw stocks made from well-beaten, hydrated stocks are basically more transparent than those made from free-beaten stocks. All other things being equal, opacity will be dependent on basis weight. The use of an opaque white pigment in the furnish increases both the opacity and brightness of the raw stock, and, therefore, the opacity and brightness of the final coated paper.

The opacity of a coated paper also will be dependent on the opacity of the coating applied; this in turn will be dependent on the composition and weight of the coating.

To illustrate these points: Table 1 shows experimental data for four raw stocks of varying opacities to which different weights of coating were applied, the basic opacity of the coating being varied by using clay alone as the mineral and mixtures of clay and titanium dioxide.

It will be noted that the opacity resulting from the application of a given weight of coating increases as the raw stock opacity increases. This effect becomes less as the opacity of the coating increases either because of increased weight or because of the inclusion of titanium dioxide. If the covering power of the coating is increased by the use of titanium dioxide it is possible to obtain the same opacity with the same weight of coating on a more transparent raw stock than with a straight clay coating on a more opaque raw stock; for example, a 15-pound coating containing 10 per cent titanium dioxide gave slightly better opacity when applied to a raw stock of 66 per cent contrast ratio than a similar weight of straight clay coating applied to a raw stock of 76.5 per cent contrast ratio.

These data also show that, especially at lower coating weights, slight variations in the coating weight have an appreciable effect on opacity. It is possible, however, by the use of titanium dioxide to obtain the same opacity using a lighter weight coating than by using a heavier weight of a straight clay coating; for example, when applied to a raw stock of 66 per cent contrast ratio, a 10-pound coating containing 10 per cent titanium dioxide gave the same opacity as a 15-pound straight clay coating.

The possibility of using lighter weight, more transparent raw stocks and lighter weight coatings pigmented with titanium dioxide to obtain opacities equal to those obtainable with heavier weight unpigmented coatings applied to more opaque raw stocks is indicated. The over-all weight of the coated paper, therefore, can be reduced without loss in opacity.

This is further illustrated in Table 2 which gives data derived from six of a series of experiments using a constant weight of straight clay coating and coatings containing varying amounts of titanium dioxide. The final brightness of the coated papers was adjusted to a constant by the use of suitable amounts of a dulling pigment, since, as will be discussed later, brightness has an effect on opacity. The approximate basis weights given for the raw stocks correspond to the opacities assuming that the composition of the raw stocks (apart from the weights) is identical.

These data again indicate that by proper coating pigmentation it is possible to make a lighter weight paper as opaque or even more opaque than a much heavier weight paper made with an unpigmented coating; for example, a 38.4-pound paper made with a coating containing 10 per cent titanium dioxide had slightly better opacity than

Table 1—Approximate Effect of Raw Stock Opacity and Coating Weight on Opacity of Coated Paper

Coating Weight Lb. 25x40—500	Per Cent Contrast Ratio (opacity)			
No Titanium Dioxide in Coating Mineral				
0 (Raw Stock)	58.0	66.0	76.5	85.0
5	69.0	74.0	82.0	88.0
10	78.0	81.0	87.0	90.5
15	84.0	86.0	90.0	92.5
20	87.0	88.5	92.0	93.5
10% Titanium Dioxide in Coating Mineral				
0 (Raw Stock)	58.0	66.0	76.5	85.0
5	74.0	78.0	84.5	90.0
10	84.0	86.0	90.5	93.5
15	89.5	90.5	93.5	95.0
20	92.0	93.0	95.0	96.0
20% Titanium Dioxide in Coating Mineral				
0 (Raw Stock)	58.0	66.0	76.5	85.0
5	78.0	81.5	86.5	91.5
10	89.0	90.0	93.5	95.0
15	92.5	93.5	95.5	96.5
20	94.0	94.5	96.5	97.5

Table 2—Approximate Effect of Basis Weight on Coated Paper Opacity, Coating Weight 10 Pounds Per Ream (25x40-500), Constant Reflectivity 75 Per Cent

Raw Stock	(1)	(2)	(3)	(4)	(5)	(6)
Per cent Contrast Ratio (opacity).....	60	65	70	75	80	85
App. Basis Wgt. Lb. 25x40—500.....	21.0	24.2	28.4	33.7	40.0	47.4
Coated Paper						
App. Basis Wgt. Lb. 25x40—500.....	31.0	34.2	38.4	43.7	50.0	57.4
Per cent Contrast Ratio (opacity) With Titanium Dioxide in Coating Mineral of:						
0%	81.4	83.5	85.6	87.8	90.0	92.0
5%	84.7	86.5	88.2	90.0	91.8	93.6
10%	87.7	89.1	90.5	91.9	93.3	94.8
20%	91.3	92.3	93.3	94.3	95.3	96.3
40%	92.7	93.5	94.2	95.1	95.9	96.7

a 50-pound paper made with a straight clay coating, while a 31-pound paper made with a coating containing 10 per cent titanium dioxide had almost as good opacity as a 43.7-pound paper made with a straight clay coating.

Naturally, the use of titanium dioxide in the coating also makes the coated paper brighter because it increases both the covering power and ultimate brightness of the coating. As noted previously, these factors together with the brightness of the raw stock and the weight of coating applied determine the brightness of the coated paper. This is illustrated in Table 3. It will be noted that a 5-pound coating containing 10 per cent titanium dioxide gave approximately the same brightness as a 10-pound straight clay coating, when applied to similar raw stocks. Such pigmentation also overcomes the dullness of the raw stocks; for example, a 10-pound coating containing 10 per cent titanium dioxide gave almost as good brightness when applied to a 74 per cent brightness raw stock, and considerably better brightness when applied to a 77.5 per cent brightness raw stock, as a straight clay coating applied to an 80 per cent brightness raw stock.

As might be expected, these conclusions are analagous to those reported in the case of lined boards, that the brightness of a lined board is dependent on the opacity and brightness of the liner and the brightness of the underlying filler (*Technical Association Papers* 22, 1939, pp. 179-182; 23, 1940, pp. 595-597; 24, 1941, pp. 537-540).

As in the case of uncoated paper, all other factors being equal, the opacity of coated paper will increase with decreasing brightness, as illustrated in Table 4. Thus, if a coated paper has a contrast ratio of 85 per cent at 90 per cent reflectivity, its opacity would be approximately 90 per cent if the brightness were reduced to 70 per cent (by the use of a suitable dulling dye or pigment in the coating). Actually, all comparisons of the opacifying power of different pigments should be made at a constant brightness, to compensate for the effect of brightness on opacity. For example, if titanium dioxide is used in the coating to increase opacity and the brightness maintained constant to that resulting from the use of a straight clay coating, the final opacity will be still greater than if the brightness had been

Table 3—Approximate Effect of Raw Stock Brightness and Coating Weight on Brightness of Coated Paper

Coating Weight Lb. 25x40—500	Hunter Reflectometer (Green Filter) Per cent Reflectivity		
No Titanium Dioxide in Coating Mineral			
0 (Raw Stock)	74.0	77.5	80.0
5	77.0	80.0	82.0
10	79.5	81.5	83.5
15	81.0	82.5	84.0
20	82.0	83.0	84.5
10% Titanium Dioxide in Coating Mineral			
0 (Raw Stock)	74.0	77.5	80.0
5	79.0	82.0	83.5
10	83.0	85.0	86.0
15	85.0	86.0	87.0
20	86.0	86.5	87.5
20% Titanium Dioxide in Coating Mineral			
0 (Raw Stock)	74.0	77.5	80.0
5	80.5	83.0	84.5
10	85.5	86.5	87.0
15	86.5	87.5	88.0
20	87.5	88.5	89.0

permitted to increase by virtue of such use of titanium dioxide.

Some of the more important factors which affect the covering power of a coating and, therefore, the opacity of a coated paper have been discussed, but it should be noted that the adhesive ratio, that is, the ratio of binder to mineral, also has its effect. The covering power (opacity) of a coating is determined primarily by differences in the refractive indices and proportions of its various components, which are essentially the coating mineral, adhesive, and air. The greatest difference in refractive indices would be between air and pigment, hence the most opaque coating would consist of these components only. If air is replaced by increasing the adhesive ratio, as shown in Table 5, the covering power of the coating and, therefore,

Table 4—Approximate Relationship of Opacity to the Brightness of Coated Paper

Hunter Reflectometer (Green Filter) Per Cent Reflectivity	Per Cent Contrast Ratio (opacity)				
90	75.0	80.0	85.0	90.0	95.0
85	77.0	81.5	86.5	91.0	96.0
80	79.0	83.0	88.0	92.0	97.0
75	81.0	85.0	89.0	93.0	97.5
70	82.5	86.5	90.0	94.0	98.0

the opacity of the coated paper is lowered. This is analagous to the decrease in opacity resulting from calendering in which the volume of the voids (i.e., the amount of air) is decreased. The amount of air present in a coating, however, is dependent on factors other than the adhesive ratio based on weight, such as the available surface area of the mineral constituent which is determined by its specific gravity and particle size and shape.

The type of starch apparently has little effect on the opacity or brightness of the coating, provided the color is reasonably constant and the adhesive ratio is maintained constant. This is illustrated by a series of experiments using ten different starches from five suppliers and starches of varying fluidity from a single supplier in which the adhesive ratios were maintained constant and the covering power of the coatings determined at different coating weights. In all cases, the covering power of the coatings made with the various starches, at given coating weights, was essentially the same. While data are not available for other adhesives, it is believed that, assuming reasonably constant color and refractive index, similar results would be obtained.

Table 5—Effect of Adhesive Ratio on Opacity of Coated Paper

10 lb. Starch per 100 lb. Titanium Dioxide			20 lb. Starch per 100 lb. Titanium Dioxide			30 lb. Starch per 100 lb. Titanium Dioxide		
lb. per ream 25x40—500		(opacity) Contrast Ratio per cent	lb. per ream 25x40—500		(opacity) Contrast Ratio per cent	lb. per ream 25x40—500		(opacity) Contrast Ratio per cent
Coating	Titanium Dioxide		Coating	Titanium Dioxide		Coating	Titanium Dioxide	
0	0	57.0	0	0	57.0	0	0	57.0
1.1	1	69.0	1.2	1	67.0	1.3	1	65.0
2.2	2	73.0	2.4	2	71.0	2.6	2	69.0
3.3	3	75.5	3.6	3	74.0	3.9	3	72.0
4.4	4	77.5	4.8	4	76.0	5.2	4	74.5
5.5	5	79.5	6.0	5	78.0	6.5	5	76.5
6.6	6	81.0	7.2	6	80.0	7.8	6	78.5
7.7	7	82.5	8.4	7	81.5	9.1	7	80.0
8.8	8	84.0	9.6	8	83.0	10.4	8	81.0

Although the foregoing discussion is based largely on experimental results, it does serve to indicate steps that can be taken commercially to improve the opacity of coated paper. While it is true that the opacity of the raw stock is of prime importance, it is sometimes impractical to increase this beyond a certain point which will be determined by such end use requirements for the final coated paper as weight, strength, and brightness. For example, there are weight limitations depending on the desired basis weight of the coated paper; there are limitations on the amount of mineral filler or of filler stock (such as de-inked paper or soda pulp) used for opacity depending on the strength required, and also there are limitations on the obtaining of opacity by means of a duller furnish because of the brightness requirements of the final coated paper. Once the opacity of the raw stock has been reached within limitations (such as those noted above) the opacity of the coated paper will be determined by the opacity of the coating. Here, again, there are certain limitations based on the end use requirements of the coated paper. While it is true that heavier coatings give greater opacity, the required basis weight of the coated paper limits the amount of coating that can be used. Even though duller coatings give higher opacity, the brightness requirements of the coated paper limit the degree of dullness of the coating that can be used. While opacity increases with decreased adhesive ratio, it is essential to have sufficient adhesive present to give a satisfactory bond between the coating and the raw stock.

It has been found in practice, as well as experimentally, that titanium dioxide furnishes a valuable means of obtaining opacity within limitations such as those noted above. For example, amounts so small as to have little effect on strength increase both the opacity and brightness of the raw stock and hence improve these characteristics in the final coated paper. Through such use a lighter weight raw stock can be made as opaque as a much heavier weight, unpigmented raw stock. Similarly the use of titanium dioxide in the coating will make a lighter weight coating as opaque as a heavier weight, unpigmented coating. These points are important in view of the growing demands for lightweight coated paper.

Management Productibility

JOHN D. CORRIGAN
Corrigan, Osburne & Wells, Inc.

▶▶▶ LABOR ASKS FOR more money. Management wants more production. And every discussion seemingly gets around to the point that the workers must produce more if they want more. Apparently we are getting further and further away from the fact that the foundation of labor productivity is management productibility.

It is the work of the managers, from the foremen to the president, that determines the output of labor. So let us not forget that managers are workers with definite production jobs. It is not their principal duty to urge, coax or coerce workers to produce more. Their main occupation is to constantly search for techniques to increase output per man per hour. This can only be accomplished by making the worker's job easier, simpler and less fatiguing.

The productibility of managers will depend upon the machinery and tools of management with which they are equipped just the same as labor productivity depends on both the worker and his tools. Managers are not born leaders, they are trained leaders. The better they are equipped, the better a company is managed. There is keen pleasure in studying the operation of a well managed company. Although problems are different in every concern, the fundamentals remain identical.

If it is true that labor is to get more money, it is equally true that generally wage increases cannot be made where productivity has not increased without a price rise. It is also true that in most companies cost reductions can be made that will far exceed any that could be made by harder work or individual efforts.

Of course, it is true that in some plants featherbedding exists and loafing is prevalent. However, in every plant where production standards are nonexistent or not properly set and tied in with an incentive, you will find that the efficiency of the plant becomes that of the inefficient workers. If you were paid as much for loafing as working without any requirements for your pay you would be human also and do as little as possible. The installation of production standards and incentives will increase labor productivity at least twenty-five per cent if properly installed after a work simplication program.

Foremen, supervisors, and executive incentives to overcome the inertia of managers will result in possible savings of over twenty per cent in overhead costs. This item is becoming one of the most important cost elements in a business. Modernization of tools and equipment should result in large savings in direct costs while overhead is generally increased slightly.

Increasing labor productivity with modern techniques can be applied to every type of industry. Can you find one in your own business?

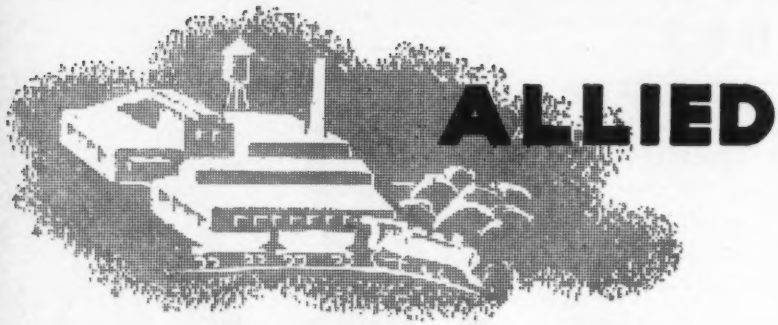
Paper SKETCHES . . . . . .

A PAPER TAPE, SPECIALLY COATED TO GIVE IT A HIGH MAGNETIC FLUX, WAS DEMONSTRATED RECENTLY IN CHICAGO AS A MEANS FOR THE RECORDING AND TRANSMITTING OF VOICE AND MUSIC.

A TWO-PLY PAPER COMPOSED OF SHEETS OF DIFFERENT TEXTURE WAS DEVISED FOR COPPERPLATE PRINTING EARLY IN THE 1800's BY JOHN DICKINSON, INVENTOR OF THE CYLINDER PAPER MACHINE

RAG FIBER USED BY MEDIÆVAL ARABS FOR PAPER-MAKING PROBABLY WAS OBTAINED BY FIRST SATURATING RAGS WITH WATER, THEN ALLOWING THEM TO FERMENT, NEXT BOILING THEM IN WOOD ASHES AND FINALLY ENCLOSING THEM IN BAGS AND WASHING IN RUNNING WATER.

A FULLING MILL WAS CONVERTED INTO A PAPER MILL TO FURNISH PAPER FOR CHRISTOPHER SAUR'S GERMAN BIBLE, PRINTED AT GERMANTOWN IN 1743. THE STEP WAS NECESSITATED BECAUSE OF UNFRIENDLY INTERESTS WHICH PREVENTED THE TWO EXISTING MILLS IN PENNSYLVANIA FROM ACCEPTING THIS BUSINESS.



WYANDOTTE MAKES REPORT ON EXPANSION PROGRAM

The $25,000,000 expansion program of Wyandotte Chemicals Corporation announced last summer is progressing (*Cf. P. I. & P. W.*, September, 1946). It is expected that this program will in some measure alleviate the present shortages of basic chemicals.

Progress on building the new Wyandotte plants as reported by Bert Cremers, vice president in charge of sales, Michigan Alkali Division, discloses the following situation at press time of this publication:

Calcium Carbonate plant—One of the three new units is already in production, a second is soon to roll, and the buildings which house all three new units are completely enclosed.

Glycol—Exteriors of the buildings are nearly completed and the greater part of the machinery is already on the job. Installation is proceeding at a rate that should bring production in the spring of this year.

Chlorine No. 3—This plant is still in the foundation stage. Construction at this writing is "on time" with production scheduled for late 1947.

Synthetic Detergent—The extra heavy foundation of this plant is well under way—78 foot piles being used instead of the 60 foot variety. Construction plans show completion is scheduled for late 1947.

Power House—Steel for the addition to the north plant power house is in place. Construction of the building and the equipment is progressing on schedule.

Alkalies—A special leaflet "Report Concerning Alkali Expansion Program of Wyandotte Chemicals Corporation" is due for distribution about the time you receive this magazine. If you are interested in this phase of Wyandotte Chemicals Corporation activities just write the company at Wyandotte, Michigan, for a copy.

Correspondence regarding the technical details of the products resulting from the $25,000,000 expansion program of the organization will be welcomed by Joseph J. Schaefer, director of development.

◆

HERCULES YEARLY REVIEW

An extensive report of company activities during the past year reveals that despite production difficulties, Hercules Powder Company opened three new plants, a laboratory, a woods camp with housing development for employees, and another housing project at a second camp. Operation of one Naval and three Army plants was undertaken in 1946, and two new products were put into commercial production, while three other product developments reached the pilot plant stage.

The new plants include a unit for the production of synthetic resins and other resinous chemicals at Burlington, New Jersey. This operation is reported to be among the most modern developments in resin chemical processing in the country. A plant located at Hopewell, Virginia, was opened for the production of sodium carboxy-methyl-cellulose, which is a new product introduced to the chemical industry in 1946. An operation for assembly and distribution of dynamite was opened at Jacksonville, Indiana.

Nearing completion, the new laboratory (Parlin, N. J.) will be part of the company's cellulose products development. Facilities of this unit will be devoted entirely to research and technical assistance efforts in the field of plastics. Manufacturing problems encountered by Hercules customers will be investigated, and improvement in the fundamental knowledge of the use of cellulosics in plastic processes will be studied.

Woods operations were established in Florida during the year in an area where pine stumps will be harvested for the Naval Stores Department. Housing facilities and company camp buildings were erected in this area, and new wood gathering equipment was installed. Additional woods facilities were opened at Brunswick, Georgia. This addition was designed to increase the output of the naval stores operations by twenty per cent, and full capacity was reached during the year. Output of three other plants was increased appreciably during 1946.

Returned to regular production, a plant using natural rubber as a raw material in the production of a paint chemical, Parlon, was on its usual schedule this year, after an absence of four years due to the inability to secure rubber.

Manufacture of carboxy-methyl-cellulose at Hopewell opens the way for commercial use of this chemical in the United States. The cellulose gum has found uses in the paper, printing, textile, ceramics, rubber, and cosmetics industries. A new resin for use in lacquers, Cellolyn 102, was introduced by Hercules in 1946, and a new toxicant for insecticides, Texaphene, was announced this past year. A rosin amine for the flotation of non-metallic ores and an aromatic alcohol for the textile processing in-

Leading the construction parade in Wyandotte Chemical Company's great expansion program is its calcium carbonate plant. Three new producing units (in two new buildings) are under roof, and one new unit already is in production. Original section of "Cal-Carb Plant" is at right. Building at extreme right is a portion of the Wyandotte Chemical's bicarbonate plant

Let's look at the Record!

As we start on our 101st year of making valves for industry, we feel that the past record of Powell Valves throughout 100 years of meeting *every* industrial flow control requirement as it has arisen constitutes a definite assurance of future performance.

So, whenever you need valves—for replacements or for new installations—consult Powell. If you have any flow control problems, Powell engineers will be glad to help you solve them.

The Wm. Powell Co., Cincinnati 22, Ohio

DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

Catalogs on request. Kindly state whether you are chiefly interested in Bronze, Iron, Cast Steel, or Corrosion-Resistant Valves.

Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke, bronze seat rings and taper wedge solid disc. Also available in All Iron.

Fig. 1503—Class 150-pound Cast Steel Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.

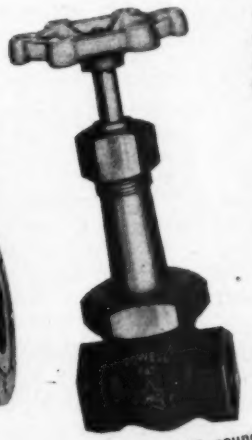


Fig. 375 — 200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel bronze disc.

Fig. 3031 — Class 300-pound Cast Steel Globe Valve. Welding ends, bolted flanged bonnet, outside screw rising stem.

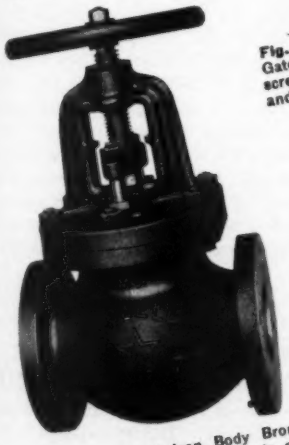


Fig. 241—125-pound Iron Body Bronze Mounted Globe Valve. Flanged ends, outside screw rising stem, bolted flanged yoke and regrindable, renewable bronze seat and disc. Also available in All Iron.

Fig. 1944—Large size 150-pound Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

Fig. 1708—200-pound Bronze Globe Valve. Has screwed ends, union bonnet, renewable, specially heat-treated stainless steel seat and regrindable, renewable, wear-resisting "Powellium" nickel-bronze, plug type disc.

POWELL VALVES

dustries have reached the testing stages.

Of particular interest to the paper industry was the research begun in 1946 by the Paper Makers Chemical Department into the by-product capacity of casein.

◆

SKF MACHINING LARGE PAPER MILL BEARINGS

Machining of large spherical roller bearings, giants weighing more than two-and-a-half tons each, is in progress at SKF Industries, Incorporated, Philadelphia. The bearings which are four feet in diameter and 1,500,000 times heavier than the smallest bearings produced by SKF will be installed on the supercalender now under construction at the Beloit Iron Works (Beloit, Wis.); the supercalender is being manufactured for the Niagara, Wisconsin, mill of the Kimberly-Clark Corporation.

Also in production at SKF are eighteen spherical roller bearings, two weighing 2,700 pounds each, and sixteen weighing 121 pounds each, for the top and intermediate rolls of the Beloit supercalender.

The rolled steel forgings which will become the inner rings of the 5,100 pound bearings for the supercalender, each of which will have thirty-eight rollers weighing thirty-five pounds apiece, were the first to be clamped into the jaws of one of SKF's boring mills for the start of operations necessary to machine them to precise dimensions. Excess metal will be removed from the forgings by carbide cutting tools before the rings are hardened by heat treatment, sand blasted, and sent to grinding machines.

Each of the bearings is designed for a basic load-carrying capacity greater than 4,000,000 pounds and will be used in support of the bottom rolls of the ten roll calender. The calender will impart a high-quality finish to paper as it passes between a series of rolls under tremendous pressure.

◆

NEW PITTSBURGH OFFICE OPENED BY RYERSON

Designed and engineered to provide efficient handling of orders, a new office located at Arch Street and Bell Avenue in Pittsburgh, Pennsylvania, has been opened by Joseph T. Ryerson & Son, Incorporated.

The office building was constructed along conventional lines of design, but its location in respect to plant operations coupled with the office arrangement will streamline customer service.

Appointments are all modern and include the most modern means of office communication between departments. The floors are asphalt tile, ceilings are acoustically treated, and the latest type fluorescent lighting is used. The structure is a two-story steel, brick, and stone construction. General offices are located on the first floor and a portion of the second floor; the remainder of the second floor is given over to rest rooms and shower facilities for office and plant personnel.

◆

BJORKSTEN LABORATORIES EXPAND—NOW INCORPORATED

Announcement has been made that a corporation will be formed under the name of Bjorksten Research Laboratories. The work of the Bjorksten Laboratories will continue under the new corporate structure.

Officers of the new company are: Johan Bjorksten, owner of the Bjorksten Laboratories, president and treasurer; Stuart O. Fiedler, vice president; and A. Charles Lawrence, secretary. As president of the new corporation, Mr. Bjorksten will continue to direct the affairs of the organization, and Mr. Fiedler will manage the South Chicago branch of the laboratories.

◆

SULPHATE OF ALUMINA PLANT WILL BE BUILT IN FLORIDA BY GEN. CHEMICAL

Construction of a sulphate of alumina plant will be undertaken by the General Chemical Company (New York City) in Jacksonville, Florida, to give service to the pulp and paper mills of South Georgia and Florida.

Building construction costs have been estimated at $37,000, and the processing equipment is valued at $223,000.

Details of the plant structure call for a two-story concrete block building, twenty by nineteen, an adjoining boiler room of similar construction, and an outdoor concrete ramp, fifty by eighty, which will hold processing equipment. A storage shed, sixty by one-hundred-seventy-five, is planned. The operations at the General Chemical plant will be known as liquid alum.

◆

NOPCO CHEMICAL COMPANY IS NEW NAME DECIDED FOR NAT'L OIL PRODUCTS CO.

Directors of the National Oil Products Company, Incorporated, have voted to change the organization's name to NOPCO Chemical Company; the proposed change is subject to stockholders' approval at their annual meeting in March.

Charles P. Gulick, president of NOPCO, is quoted, "The proposed name change is in recognition of the Company's vastly increased sphere of operations and the number and diversity of its products and markets. The corporation is not an oil company,

Grinding begins on one of the large roller bearings now being machined at SKF Industries, Inc. These bearings, the largest spherical roller bearings ever built in the U. S., will be installed on the huge supercalender now being built for Beloit Iron Works for the Niagara (Wis.) mill of Kimberly-Clark Corp.

◆

ONE *recognized standard*

THE COTTRELL PROCESS OF ELECTRICAL PRECIPITATION

FOR GAS CLEANING, smoke abatement and removal of dust, fume, tar and other suspended matter from gas, there has been one universally accepted process for more than thirty years. In answer to your special problem, a Cottrell installation incorporating this rich experience in research, development and worldwide operation means the complete fulfillment of your requirements.

RESEARCH CORPORATION

NEW YORK 17: 405 LEXINGTON AVENUE
CHICAGO 3: 122 SO. MICHIGAN AVENUE

as its present name would imply, but a chemical manufacturing company. Nearly all of its products are manufactured from oils, fats, and waxes by processes involving chemical reaction."

Continuous and extensive research have multiplied the number of products processed by the firm during its forty years existence. Among the output of NOPCO's facilities are industrial chemicals, metallic soap, vitamin concentrates, and other pharmaceuticals.

◆

SEATTLE PLANT OCCUPIED BY LINK-BELT COMPANY

Completion and occupancy of the Link-Belt Company's Pacific Division plant at Seattle was effected recently. The new development houses a machine shop, expanded warehouse space, and a modern office building, all designed to extend more adequate service to the industries of the Northwest.

Fred A. Koepf, district manager, and Harvey V. Eastling, engineering sales manager, both of whom make their headquarters in Seattle, will direct the activities of Link-Belt in this area.

The new mailing address of the company is 3405 Sixth Avenue, Seattle (4).

◆

▶▶▶ BRANCH SALES OFFICES located in the Empire State Building, New York City, have been opened by Stein Hall & Company. The new branch which has been established to render more complete sales service for the company's expanding activities will be managed by C. J. Dunachie, who will be assisted by E. M. Claven.

◆

▶▶▶ VOLUNTARY RETIREMENT from active business participation of Holdon M. Ashby and James L. Braman, has brought changes in the executive group of F. C. Huyck and Sons, Albany, New York. James L. Braman will be chairman of the board; Francis H. Eldridge, president; Harry Eldridge, first vice president and treasurer; Charles V. Spencer, second vice president; and Roderick T. Clarke, secretary.

◆

▶▶▶ BRANCH OFFICES in Philadelphia have been announced by Reeves Pulley Company, Columbus, Indiana. Through this branch office the company hopes to give better service to its customers in the Philadelphia territory. A stock of Vari-Speed Motor Pulleys and replacement parts for all standard sizes of Reeves units will be built up as rapidly as possible. Phillip C. Talbot is manager of the new branch; William A. McCosh will assist him. The office is located in the Wilford Building, 33rd and Arch Streets, Philadelphia 4, Pennsylvania.

Link-Belt Company's new plant at Seattle

◆

HAYES MFG. CORP. TAKES OVER AMERICAN ENGINEERING

The acquisition of American Engineering Company and its subsidiaries by the Hayes Manufacturing Corporation, of Grand Rapids, Michigan, has just been announced. The transaction, however, became effective October 1, 1946. The American Engineering Company retains its corporate identity; it will not be merged with Hayes.

Rensselaer W. Clark, president, general manager, and director of the Hayes corporation for the past five years, has been elected president of American. He will retain Grand Rapids as his headquarters.

◆

The shift of phosphoric acid and ▶▶▶ SALE OF THE North Monmouth, Maine, textile concern, formerly known as the Bowers Division of the Nashua Manufacturing Company, to the Albany Felt Company (Albany, N. Y.) has been announced. Operation of the Bowers Division was assumed by the new owners on January 1, and activities of the company became the responsibility of C. P. Drum, president.

◆

MONSANTO COMPLETES TRENTON (MICH.) PLANT

Final installation for the manufacture of phosphoric acid and sodium phosphate has been completed by the Monsanto Chemical Company at Trenton, Michigan.

sodium phosphate operations from Monsanto's plant at Annison, Alabama, began with the opening of the Trenton plant at 1942. Due to wartime restrictions the Trenton development was delayed, but with the relinquishment of emergency restrictions production is now under way at Trenton. The production of tetrasodium pyrosphate, formerly manufactured at the Monsanto, Illinois, plant has also been shifted to the Michigan operation.

◆

▶▶▶ GENERAL DISTRICT sales offices of the Pennsylvania Salt Manufacturing Company of Washington opened in December at 6400 North West Front Street, Portland, Oregon. LeRoy M. Shaneman, who has been connected with the Tacoma office of the company since completing Navy duty during the war, has been appointed district sales manager in charge of the new office.

◆

DIAMOND ALKALI COMPLETES FINANCIAL NEGOTIATIONS FOR EXPANSION PROGRAM

Final negotiations were completed on January 3, by the Diamond Alkali Company, Pittsburgh, for a loan through the Mellon National Bank & Trust Company. This ten-year loan assists the completion of a $20,000,000 financial venture for expansion and modernization of its properties.

The project calls for the construction of a $10,000,000 electrochemical plant which is underway at Houston, and a $10,000,000 modernization of the Diamond main operations at Painesville, Ohio. A new silicate of soda plant is under construction in Chicago.

- Anticipates Speed Changes
- Eliminates Drag

Sandy Hill-SPENCER DANDY ROLL DRIVE

Increased Sharpness of Watermark

This drive was developed primarily for controlling dandy speed compared with the speed of the wire, resulting in a far superior watermark in clarity of outline. However, it also improved the sheet so that the machine could be speeded up twenty-five per cent on equal quality.

THE unit as manufactured by Sandy Hill is covered by patents both in the United States and Canada. An important feature of this design is that weighting of one side more than another is completely eliminated. The drive shafting permits the Dandy Roll to follow any slight oscillation of the wire from side to side.

Better Formation at Higher Speeds

The Sandy Hill—Spencer Dandy Roll Drive facilitates fibre formation and closing, enhancing the finish of the sheet. It gives more even distribution in laying the sheet and perfect control for "localizing."

THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, N. Y.

ACME STEEL SEPARATES SALES INTO TWO GROUPS

Sales organization changes have taken place within the Acme Steel Company, Chicago. Beginning on January 1, sale of consumer products in the steel strapping and stitching wire line together with machines for industrial application of these products were placed under the direction of John E. Ott, who has been named general manager of consumer sales.

John Ekern Ott

Sale of producer products which includes hot rolled and cold rolled strip steel will be directed by Allen B. Wilson, general manager of producer products.

C. J. Sharp, formerly vice president, director of sales, has been elected to the newly created office of executive vice president.

◆

▶▶▶ THIRD STEP IN the postwar expansion program of the American Lumber & Treating Company is the construction of a large plant at Everett, Washington, capable of chemically treating more than a million board feet of lumber a month. The output of the new plant will be wood alloyed to resist fire, rot, and insects.

◆

LINK-BELT ESTABLISHES OFFICES IN MILWAUKEE

Opening of a sales office in the Century Building, Milwaukee, Wisconsin, has been announced by Link-Belt Company, Chicago. Territory formerly served from the Pershing Road plant in Chicago will come under the administration of the new sales office, and it is expected that more adequate service can be extended the customers of the company in the Milwaukee area. District sales manager, William M. Hufnagel will manage the office assisted by H. B. Johnson and F. E. Sweeney.

◆

GRAVER TANK & MFG. CO. BUYS BANKS MORELAND CO.

Business formerly operated under the name of Banks Moreland Company, Houston, Texas, has been purchased by the Graver Tank & Manufacturing Company, Incorporated, East Chicago, Indiana. In the Southwestern section of the United States, the Banks Moreland Company will continue operation under its own name and in a divisional status under the Graver organization.

The new division will be managed by Banks Moreland, who has been made a vice president of the Graver company. The integration of the two companies will offer more complete service to users of products manufactured by them.

◆

▶▶▶ CONTRACTS COVERING design, purchasing, construction, and supervision of a new chlorine plant for the Delhi Cloth & General Mills Company, Limited, Delhi, India, have been awarded to The H. K. Ferguson Company, New York City. The plant will be locally owned and operated by Indian interests and will be used in the production of caustic soda and hydrochloric acid in addition to the basic chlorine manufacture. The capacity of the new plant will be ten tons of liquid chlorine a day with provision being made to facilitate the future increase of its output to twenty tons daily.

◆

TWO NEW SALES OFFICES WILL DISTRIBUTE DUPONT PIGMENTS IN CALIFORNIA

Establishment of two new DuPont sales offices to cover the Los Angeles and San Francisco areas was accomplished January 1. The new branches will handle the distribution of white pigments and dry colors throughout California. The merchandising of these products was previously handled by C. L. Duncan Company of Los Angeles.

The southern California and Los Angeles territory will be served from an office in Pasadena, located in the Security Building, 243 East Colorado Street. Dr. Joseph Shrawder, Jr., who will direct the West coast activities of the DuPont pigment sales, will make his headquarters in the Pasadena office; this office will be managed by Wilbur S. Johnson, formerly manager for the C. L. Duncan Company.

The San Francisco office will be managed by George B. McCrea, who was pigment sales representative in Chicago before the war. The location of the San Francisco branch will be in the Merchants Exchange Building, 465 California Street.

A technical service laboratory at El Monte, California, is also operated by the pigment department of the DuPont organization.

◆

▶▶▶ CONSOLIDATION OF the Chicago office of Hewitt-Robins, Incorporated, has been effected. The Robins Conveyor Division has moved from 37 West Van Buren Street to the Hewitt Rubber Division at 7 South Dearborn Street, Chicago 3. Enlarged quarters are adequate to warrant the combining of the offices.

◆

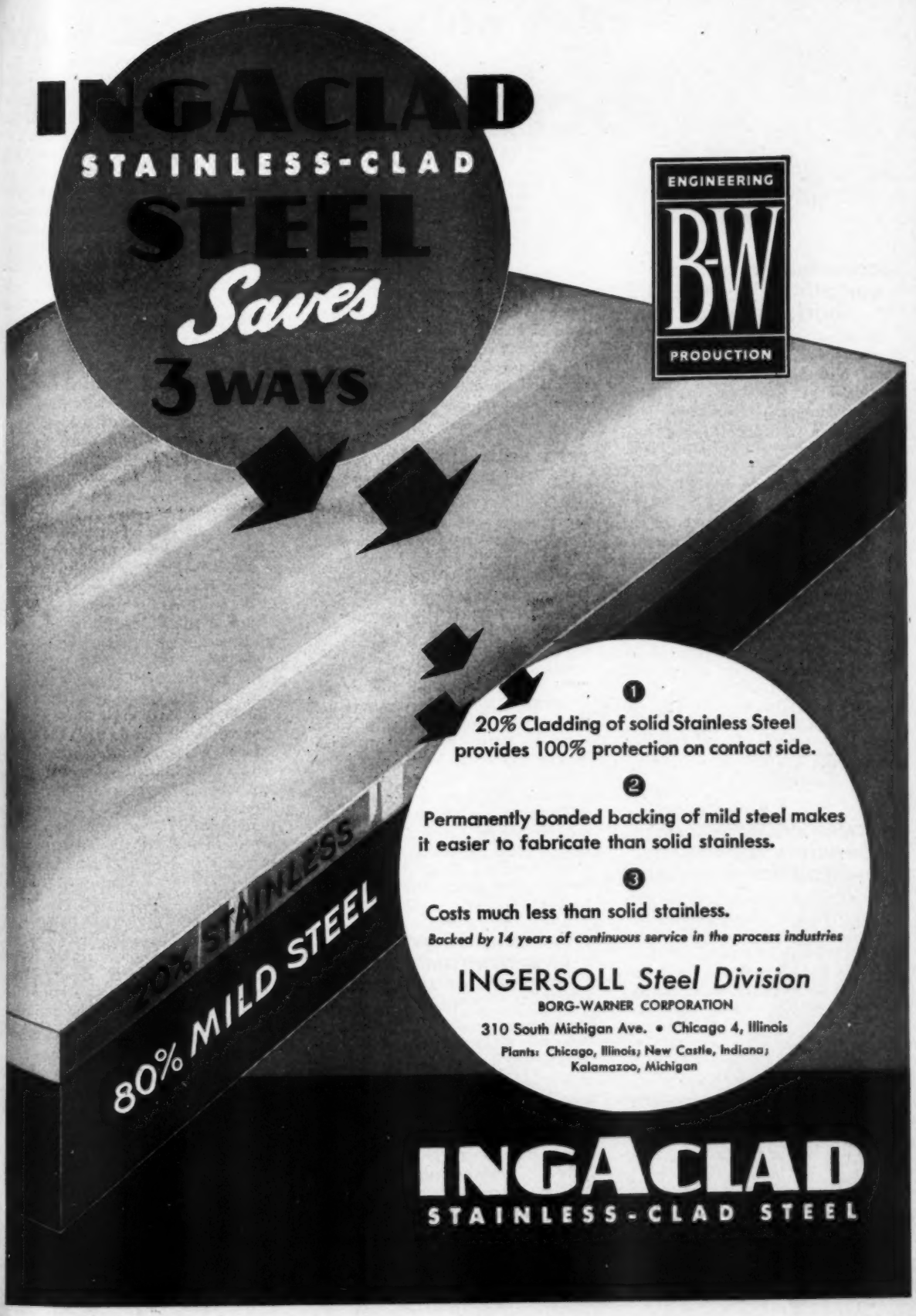
DIAMOND ALKALI ACQUIRES BENNER CHEMICAL ASSETS

The Diamond Alkali Company, Pittsburgh, has acquired the assets of Benner Chemical Company, Chicago. Under the new ownership the former Benner organization will function as the Diamond Alkali Company, Benner Chemical Sales Division.

On January 1, when the change in control was effected, S. R. Benner, president of the company which bears his name, resigned, and the new Diamond Division was placed in charge of C. W. Klaus and E. J. Mills.

S. R. Benner

Benner Chemical Company was founded in 1918 by Mr. Benner. The organization was a major distributor in the Midwest of Diamond Alkali products and other heavy chemicals. The company served the phosphate, petroleum, meat packing, and baking powder industries.


INGACLAD
STAINLESS-CLAD
STEEL
Saves
3 WAYS
ENGINEERING
B-W
PRODUCTION
20% STAINLESS
80% MILD STEEL
1
20% Cladding of solid Stainless Steel provides 100% protection on contact side.
2
Permanently bonded backing of mild steel makes it easier to fabricate than solid stainless.
3
Costs much less than solid stainless.
Backed by 14 years of continuous service in the process industries
INGERSOLL Steel Division
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310 South Michigan Ave. • Chicago 4, Illinois
Plants: Chicago, Illinois; New Castle, Indiana; Kalamazoo, Michigan
INGACLAD
STAINLESS-CLAD STEEL

SUPERINTENDENTS ANNUAL CONVENTION IN CHICAGO-EDGEWATER BEACH HOTEL

Recalling the Silver Anniversary meeting of The American Pulp and Paper Mill Superintendents Association held at the Edgewater Beach Hotel, Chicago, in May 1944, (Cf. P.I. and P.W., June, 1944) this year's annual meeting will be held "same month—same place." Specifically, the dates for the meeting will be May 22 to May 24.

In order to assure delegates to the 1947 Convention accommodations at the Convention Hotel (the demand for space is still great in Chicago), the Association has requested that those members who definitely plan to attend the meeting and those who possibly shall attend the meeting make reservation arrangements immediately. Should occasion arise preventing any members from attending the Chicago gathering, reservations may be canceled; but it is impossible for the hotel to guarantee rooms to those delegates making reservations late.

◆

AMA ANNOUNCES TWO-DAY CONFERENCE FOR FINANCE EXECUTIVES OF INDUSTRY

Two-day conferences will be held by the American Management Association at the Hotel Commodore, New York City, February 5 and 6, at which industrial finance executives will discuss the problems currently facing American business. Under consideration at the meeting the expanding cash requirements of industry will be considered, the trend of interest rates on corporate obligations will be discussed, and the need for revision of business taxes will be studied.

AMA's vice president, Finance Division, and editor of the *New York Journal of Commerce*, Dr. Jules I. Bogen stated that the conference will also investigate the necessity for cash reserves against prospective losses on fixed and current assets acquired at current high prices. Revision of capital budgets to meet mounting costs of new construction and equipment will be considered. Methods of corporate financing with a view to present great demands for capital, interpretations of company financial position to stockholders and employees, the broadening responsibilities of finance executives and the outlook for commodity prices and fluctuation monies will undergo study.

◆

CPPG HOLD ANNUAL CHRISTMAS PARTY

A most interesting and entertaining program was arranged by Herb Vogel of the Ace Carton Corporation, Chicago, for the annual Ladies Night and Christmas Party of the Chicago Professional Paper Group. Mr. Vogel, who acted as master of ceremonies, was formerly with one of the city's best known night clubs.

In the way of professional entertainment, there was music and singing by strollers during refreshments and dinner, also some unusually clever tricks by a really dexterous magician, popular and sophisticated songs by an accomplished artist, and stories and impersonations by a clever monologist.

The party was held in the main dining room of the Chicago Bar Association, 29 South La Salle Street, Chicago, regular meeting place of the group. About 175 members and guests were present.

◆

TWO SOUTHERN DIVISIONS OF SUPERINTENDENTS MEET TOGETHER AT JACKSONVILLE

Delegates of the Southern and Southeastern Divisions of the American Pulp and Paper Mill Superintendents Association met in Jacksonville late in November. The three-day convention heard addresses by William A. McRae, Jr., and considered technical discussions which were directed by Harry Hulmes of the United States Rubber Company and Roger G. Nevins of the National Container Corporation.

In a banquet address, Mr. McRae discussed the United Nations Organization. During his wartime assignment as a colonel with the air forces, he had an opportunity to cover the activities of the UNO while assigned to the United Nations Conference on International Organization at San Francisco. Mr. McRae held that the UNO was the only instrument through which the world can be assured of peace and security.

R. H. Laftman, vice president and general manager of the National Container Corporation's kraft pulp and board division, acted as toastmaster at the convention. The recreational activities of the delegates were rewarded with prizes for the golf tournament.

◆

WELDING AWARDS PRESENTED AT WELDER MFRS. ASS'N

Occasion for the presentation of the 1945-46 Samuel Wylie Miller Memorial Medal, prizes of the Resistance Welder Manufacturers' Association, the 1946 Lincoln Gold Medal, and the 1946 A. F. Davis Undergraduate Welding Awards, was the banquet of the American Welding Society at its twenty-seventh annual meeting held at the Ambassador Hotel, New York City, the latter part of November.

James F. Lincoln, president of the Lincoln Electric Company, Cleveland, Ohio, was awarded the Samuel Wylie Miller Memorial Medal for his most effective promotion of electric arc welding.

Julius Heuschkel, research engineer for the Westinghouse Research Laboratories, East Pittsburgh, Pennsylvania, received first prize in the 1946 Resistance Welder Manufacturers' Association Prize Contest. Joseph J. Riley took second prize, and Robert W. Bennett and Robert D. Williams took third prize. These men contributed papers to the welding industry warranting their receipt of the awards.

H. E. Kennedy was awarded the Lincoln Gold Medal for his paper, "Some Causes of Brittle Failures in Welded Steel Structures."

Joseph S. Ward, Jr., and Lee Ragsdale, Jr., received the A. F. Davis Undergraduate Welding Award for papers which appeared in the engineering magazines of Manhattan College and Duke University.

◆

CONNECTICUT GOVERNOR TO SPEAK AT LUNCHEON OF THE SALESMEN'S ASSOCIATION

Guest speaker at the luncheon of the Salesmen's Association of the Pulp and Paper Industry during Paper Week will be Governor James L. McConaughy, of Connecticut.

The luncheon will be held on Tuesday, February 25, in the Grand Ballroom of the Waldorf Astoria Hotel, in New York City. The Salesmen's

How to Speed Piping Jobs in Pulp and Paper Mills

A lot of mills know how and are profiting by it. They know the time and trouble saved on every job by having Crane supply all materials: valves, fittings, pipe, fabricated piping, and accessories.

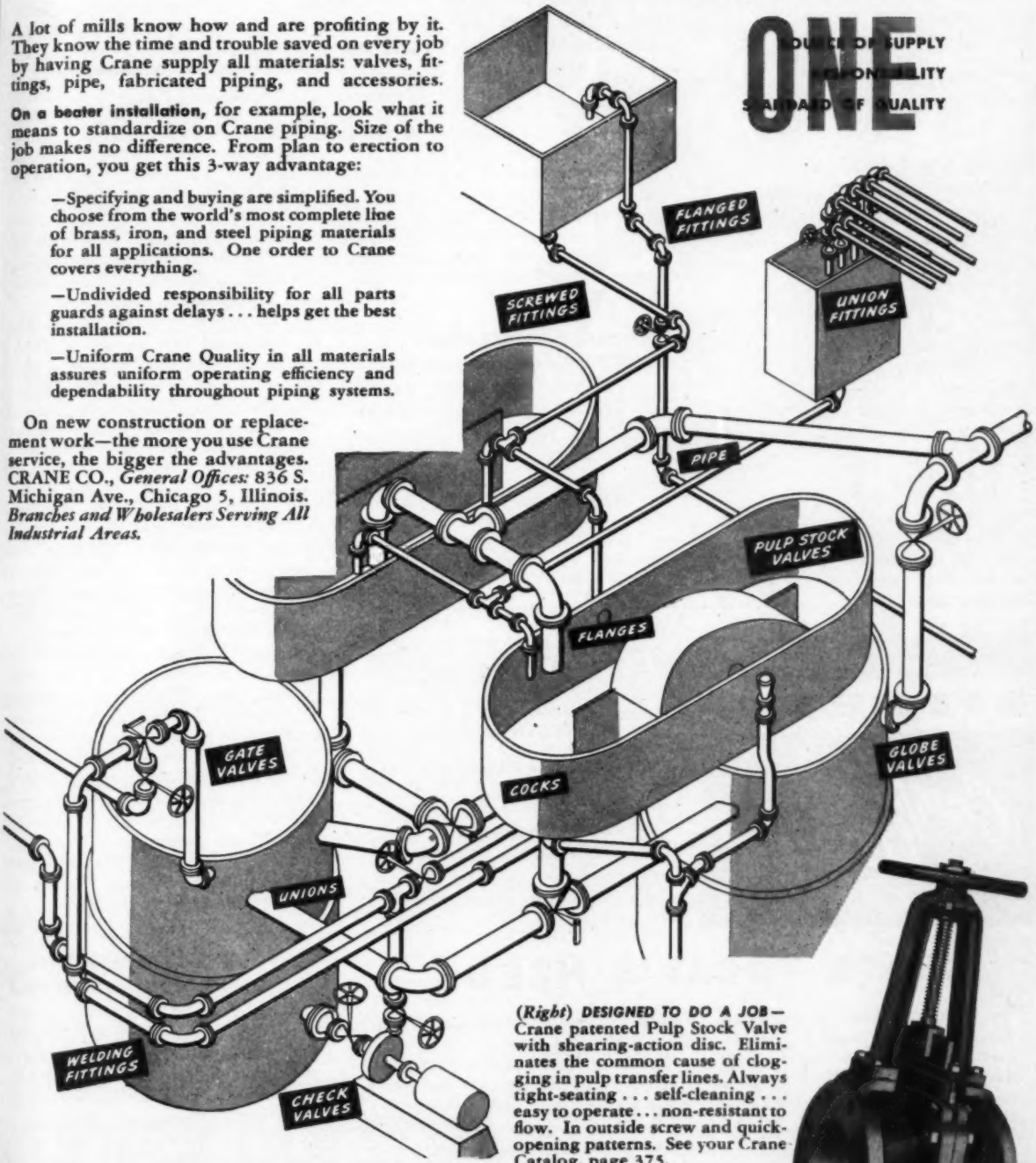
On a beater installation, for example, look what it means to standardize on Crane piping. Size of the job makes no difference. From plan to erection to operation, you get this 3-way advantage:

—Specifying and buying are simplified. You choose from the world's most complete line of brass, iron, and steel piping materials for all applications. One order to Crane covers everything.

—Undivided responsibility for all parts guards against delays . . . helps get the best installation.

—Uniform Crane Quality in all materials assures uniform operating efficiency and dependability throughout piping systems.

On new construction or replacement work—the more you use Crane service, the bigger the advantages. CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois. *Branches and Wholesalers Serving All Industrial Areas.*



(*Right*) ***DESIGNED TO DO A JOB***— Crane patented Pulp Stock Valve with shearing-action disc. Eliminates the common cause of clogging in pulp transfer lines. Always tight-seating . . . self-cleaning . . . easy to operate . . . non-resistant to flow. In outside screw and quick-opening patterns. See your Crane Catalog, page 375.

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VALVES • FITTINGS
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FOR EVERY PIPING SYSTEM

Association luncheon is one of the social events of the week. It will start promptly at 12:30 p. m.; reservations should be made immediately with E. G. Amos, secretary of the Salesmen's Association at 122 East 42nd Street, New York 17, N. Y. Alan Helffrich, St. Regis Paper Company and Eastern Vice President of the Salesmen's Association, is chairman of the Program Committee

◆

PACIFIC NW TECHNICAL GROUP HAS FIRST ANNUAL MEETING IN LONGVIEW

First annual meeting of the Associated Forest Products Technologists, Pacific Northwest technical group was held at Longview, Washington, last month. Speakers for the occasion were Dr. J. B. Grantham, professor of wood products at Oregon State College, Uno Lowgren, president of the American Defibrator Company, R. J. Seidl of the Forest Products Laboratory, Madison, Wisconsin, and Armin Elmendorf, president of the Elmendorf Corporation, of Chicago.

Discussing recovery of logging waste in the Douglas fir areas, Dr. Grantham said that the use of lighter and less cumbersome logging equipment is making it possible to reclaim such material heretofore designated as waste. Approximately 700 million board feet of logs are recovered each year in this way.

◆

PAUL KELLOGG LEAVES CANADIAN NEWSPRINT ASS'N

General manager of the Newsprint Association of Canada, Paul Kellogg, who undertook the position for wartime and postwar necessity has resigned.

Mr. Kellogg plans to devote all his time to his position as president of Stevenson and Kellogg Limited, a firm of management engineers. The firm has acted as statistcal agent for the Newsprint Association for the past ten years.

◆

ILLUMINATION FEATURED SUBJECT AT GROUP MEETING EMPIRE STATE SEC. TAPPI

At the monthly meeting of the Western New York Group of the Empire State Section of TAPPI held December 11, at the Prospect House, Niagara Falls, New York, B. A. Thomas, divisional engineer of the Empire Lamp Division of General Electric Company gave a demonstrational address.

The meeting was directed by Dr. A. Nadelman, chairman of the Western New York group, and Mr. Thomas was introduced by Mr. Rusch. Speaking of the development of the incandescent lamp from the earliest Edison bulb which produced 1.4 lumens per watt to the present day mercury arc fluorescent lamps which render 60 to 65 lumens per watt, Mr. Thomas demonstrated several types of special lights among which were the germicidal lamp which destroys airborne bacteria and the "black light" which illuminates fluorescent materials.

Mr. Thomas stressed the need for adequate lighting in his discussion of matching color shades; and he emphasized the variable human factors which need precautionary measures in judging color under constant illumination. He considered two sources of illumination to be essential at 6500 degrees Calven color temperature. Mr. Thomas forecast further developments that will add to human comfort in bringing the sunlight quality to indoor lighting.

◆

▶▶▶ GUEST SPEAKER AT the final dinner meeting of the season held by the Eastern Paper Mill Suppliers' Association at the Roger Smith Hotel, Holyoke, Massachusetts, was James N. Logan, who is the treasurer and general manager of the Newton Paper Company. Host for the associations meeting was Robert Belsky, president of the Paper Mill Supply Company of Holyoke. Mr. Belsky was assisted by Maurice Marcus, treasurer of the Marcus Paper Company, New Haven, Connecticut, and Charles S. Ardolino, purchasing agent of Dave's Mill Supply Company, New Haven. Special guests of the evening were Ned Hayward of the American Writing Paper Corporation and William Newton of the Newton Paper Company.

◆

ASME JOINS INTERNATIONAL ENGINEERING CONFERENCE

Participation of American engineers in a permanent World Engineering Conference with headquarters in Paris, was announced by Clarence E. Davies, secretary of The American Society of Mechanical Engineers at the society's Annual Meeting held at the Hotel Pennsylvania, New York City, in December.

The new world technical organization will have a working arrangement with the United Nations Educational, Scientific, and Cultural Organization, and the Committee on International Relations of the Engineers Joint Council will be the medium for organizing American participation. Chairman of the committee is Malcolm Pirnie, and

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17 Plate Tile Lining Installations.

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Stebbins Service is based on research and experience covering 63 years devoted exclusively to developing materials, designs, and installation techniques.

Wherever it may be, one contract, one responsibility covers the complete installation. This involves; a study of your problems, a design based on the chemical and mechanical requirements involved, and a construction that will assure long life.

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Large diameter Trentweld tubing is a friend of mill men — and mill management... a strong, substantial light weight tubing in diameters up to 30 inches, for handling stock lines or acid piping on a trouble-free basis. Made of stainless steel, it is completely free of corrosion, eliminates forever all losses from contaminated water or pulp. Even more, the glass-smooth inside surface guarantees lowered friction and reduced pumping costs. It's a hard, tough tube made to outlast several ordinary pipe lines — economical service performance that's well worth thinking about. And when it's time to change, or time to install initially, you'll find Trentweld a light lift that makes the job go faster and easier.

Of course, there's a basic technical story behind this friendly tubing that you ought to hear — to judge its opportunities and advantages in handling pulp, in acid recovery, in white water lines — in short in all heating, conveying or processing problems that confront your mill. An opportunity to explain it to you will be welcome. Write Department 17 — without obligation.

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TRENT TUBE MFG. CO.

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secretary of the committee is Stewart E. Reimel. As soon as formal approval is received from the Engineers Joint Council, a national committee will be set up in which all engineering societies of the United States may engage in the organizational work of the World Engineering Conference.

Headquarters for the committee will be in the Engineering Societies Building, 29 West 39th Street, New York City.

◆

▶▶▶ FIRST ANNUAL MEETING of the National Council of Salesmen's Organizations, which now embraces eighteen salesmen's associations in a variety of fields, was held recently in New York. Predictions made at the meeting indicated that 500,000 new salesmen would be hired during the new year. Members of the National Council were urged to lend their assistance in aiding newcomers to the selling profession to join the ranks of the Council.

◆

▶▶▶ SUPPLY AND DEMAND for synthetic resins should come into balance during 1947, according to Henry M. Richardson, partner in the firm of DeBell and Richardson, Incorporated, consulting engineers, Springfield, Massachusetts. In a paper presented to the plastics industry on "Advances in Plastics During 1946," Mr. Richardson spoke at a meeting of representatives of that industry who convened with the American Society af Mechanical Engineers; he stated, "there is in process an expansion of the capacity to produce synthetic resins which should double the 1945 output and be three and one-half times the 1941 output and almost seven times that of 1939. It is expected that supply and demand may come into balance some time during 1947, provided we have a free economy and are not beset by industrial stoppages."

◆

WINNERS CHOSEN IN SECOND BOLTON AWARD CONTEST

Announcement is made that judging has been completed on the second Bolton Award Contest, conducted under the auspices of the American Pulp and Paper Mill Superintendents Association.

The subject of papers submitted in this contest was "How Superintendents and Foremen Can Help Management."

According to the rules of the Contest, six awards were made for papers submitted by members of each of the Divisions of the Superintendents Association. From those winners were chosen three winners in the national contest. These three winners were:

Frank W. Roberts, S. D. Warren Company, Cumberland Mills, Maine, first prize, a $500 U. S. Savings Bond.

S. A. Brown, Rogers Corporation, Manchester, Connecticut, second prize, a $300 U. S. Savings Bond.

George R. K. Moorhead, Oregon Pulp and Paper Company, Salem, Oregon, a $200 U. S. Savings Bond.

U. S. Savings Bonds were also awarded in the Divisional Contests, each Division receiving: First prize, $200; Second prize, $100; four prizes each $25.

◆

▶▶▶ ELECTION OF OFFICERS climaxed the annual meeting of The Association of American Wood Pulp Importers held December 12. Returning to office again are: Rolf G. Westad, president; J. Donaldson, vice president; V. Ramsay, treasurer; G. F. Baine, secretary; and A. J. Pagel, director.

◆

▶▶▶ HIGHEST HONOR OF the American Society of Mechanical Engineers, the A.S.M.E. Medal, was presented to Morris Evans Leeds, founder and chairman of the board of the Leeds & Northrup Company (Philadelphia) and pioneer in the development of modern electrical instruments. The medal was presented to Mr. Leeds at the society's annual banquet, held at the Hotel Pennsylvania recently.

◆

COMING EVENTS

Jan. 29-31—Annual meeting of the Technical Section, Canadian Pulp and Paper Association, Mount Royal Hotel, Montreal, Canada.

Feb. 23-27—Annual meeting of the American Paper and Pulp Association and paper groups, at the Waldorf-Astoria Hotel, New York City.

Feb. 24-27—Annual meeting of the Technical Association of the Pulp and Paper Industry, at the Commodore Hotel, New York City.

April 28-May 1—Annual meeting of the Chamber of Commerce of the United States, Washington, D. C.

April 29-May 1—Second Annual Industrial Packaging and Materials Handling Exposition, at the Sherman Hotel, Chicago, Illinois.

May 22-24—Annual meeting of The American Pulp & Paper Mill Superintendents Association, at the Edgewater Beach Hotel, Chicago, Illinois.

Oct. 21-25—The Pacific Chemical Exposition, at the San Francisco Civic Auditorium, San Francisco, California.

STATED MEETINGS

Chicago Professional Paper Group meets the third Monday of each month at the Chicago Bar Association, Chicago, Illinois.

The APCO Pump—available in capacities to 150 G.P.M. and heads to 600 feet — is the highest development of the Turbine-Type Pump. Handles any free flowing liquid including NON-LUBRICATING liquids almost indefinitely without wear. Distinguished on small capacity, high head duties — water supply, Boiler Feed, Condensation Return, Circulating, Transfer, Booster, Self Priming, Marine, Distillery, Dairy, Special Metal — "1001" Duties. Delivers with slight change in capacity against drastic head conditions.

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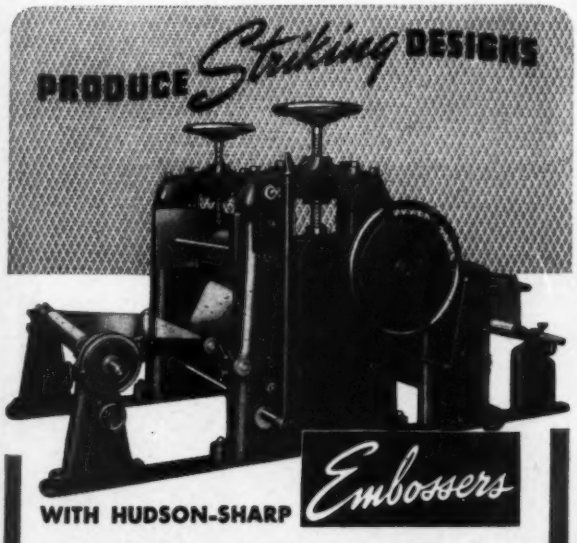
FOR PAPER MILLS



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CIRCULAR KNIFE GRINDER

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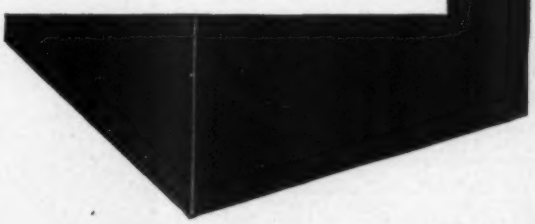
Knives stay sharp and true when you give them a Rogers CC-3 grinder treatment; they last longer, too. Special attachment for mounting heavy bottom slitters used on paper machines between centers—an exclusive Rogers feature—provides universal application for this rugged grinder. Easy to operate right in your own mill. For knives 2" to 20" diameter. Write for circular CC.



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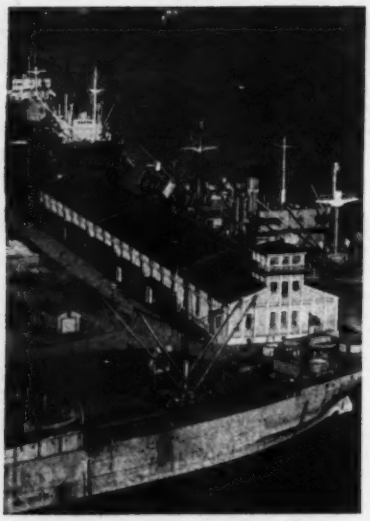

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Throughout other parts of Canada, hundreds of Layne Well Water Systems are also serving cities, factories, military and ammunition plants, and a very wide variety of general municipal and industrial uses.

Neither geographic location nor climatic conditions affect the high efficiency, long life, low operation cost or unmatched dependability of the world famous Layne Well Water Systems. For literature, address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

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LAYNE

WELL WATER SYSTEMS
VERTICAL TURBINE PUMPS

S A F E T Y

SAFETY SCORES

▶▶▶ THIRTY-THREE MILLS have completed the first four months of The Paper Industry Safety Contest (July to October, 1946 inclusive) with perfect scores. Frequency rates for all contestants are down six per cent in comparison with the rates for the same period of the 1945-1946 contest. The following mills topped the four-month period without a reportable injury:

Division I—Pulp and Paper Mills

Group A

The Flintkote Co. (Pioneer Div.), Los Angeles, Calif.

Price Bros. & Co., Ltd., Riverbend, Quebec, Can.

Group B

P. H Glatfelter Co., Spring Grove, Pa.

Kimberly-Clark Corp., (Badger-Globe Mills), Neenah, Wis.

Price Bros. & Co., Ltd. (Jonquiere Mill), Jonquiere, Quebec, Can.

Group C

Strathmore Paper Co. (West Springfield Mills), West Springfield, Mass.

Certain-teed Products Corp., Savannah, Ga.

Certain-teed Products Corp., E. St. Louis, Ill.

Oswego Falls-Sealright Corp. (Sealright Paper & Pulp Div.), Fulton, N. Y.

Certain-teed Products Corp., York, Pa.

Certain-teed Products Corp., Niagara Falls, N. Y.

Container Corp. of America, Circleville, Ohio.

Crown Zellerbach Corp. (Crown Willamette Paper Co. Div.), Lebanon, Ore.

Group D

Marathon Corp., Ashland, Wis.

United States Gypsum Co., Oakmont, Pa.

Spaulding Fibre Co., Inc, Milton, N. H.

Strathmore Paper Co. (Woronoco Mill No. 1), West Springfield, Mass.

E. I. du Pont de Nemours & Co., Inc. (Russell Plant), Huntington, Mass.

International Paper Co., Livermore Falls, Maine.

Certain-teed Products Corp., Buffalo, N. Y.

Alton Box Board Co., Carlyle, Ill.

Container Corp of America, Wilmington, Del.

International Paper Co., Riley, Maine.

Division II—Paper & Board Remanufacturing

Group A

None.

Group B

Old Colony Envelope Co., Westfield, Mass.

Kimberly-Clark Corp., Memphis, Tenn.

Bird & Son, Inc. (Roofing Plant), Shreveport, La.

Bird & Son, Inc. (Roofing Plant), Chicago, Ill.

Container Corp. of America, Philadelphia, Pa.

Fort Wayne Corrugated Paper Co. (Rochester Div.), Rochester, N. Y.

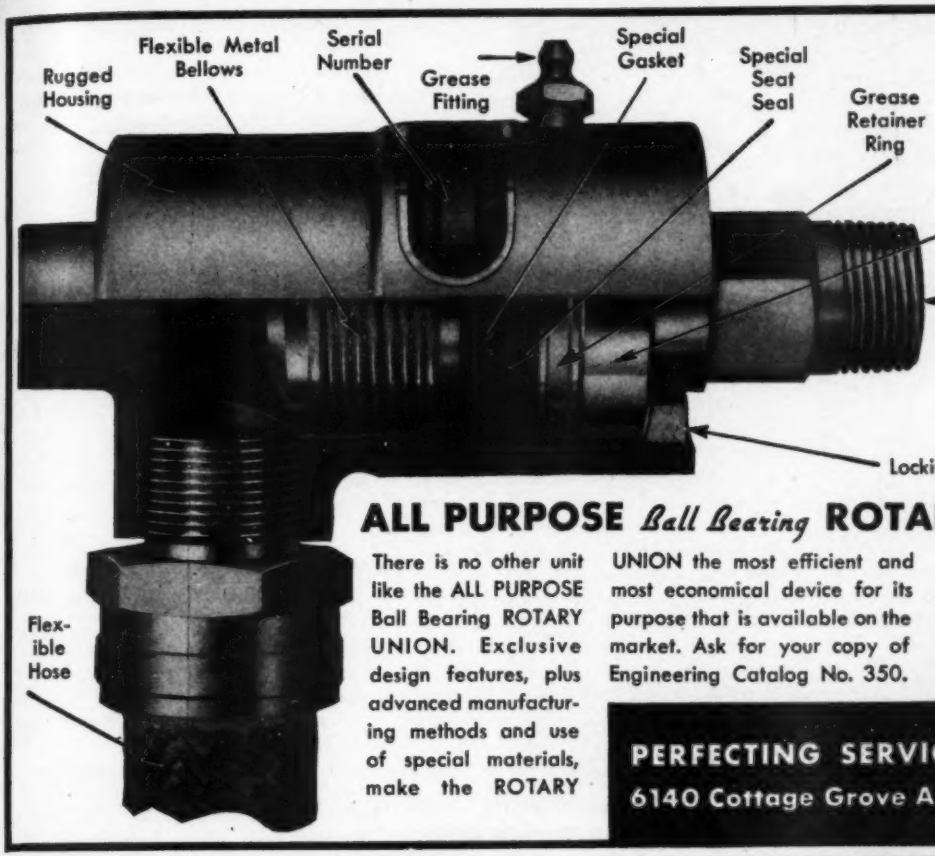
The Flintkote Co. (Hollywood Paper Box Div.), Los Angeles, Cal

Thilmany Pulp & Paper Co. (Bag Mill), Kaukauna, Wis.

Gaylord Container Corp., Milwaukee, Wis.

Bay West Paper Co., Green Bay, Wis.

Members of the Safety Committee of the Mt. Tom Division of American Writing Paper Corporation, Holyoke, Mass. Seated are Superintendent James Lister (left) and Safety Engineer Andrew Wilson. Standing (L to R): Armand Paquin, John Olcott, Felix Marciniak, Patrick Loftus, Thomas Cauley, Edward McCarthy, John Harre, George Boldway, John Gilmore, and Al Brunelle. This division has been leading AWP's inter-divisional safety contest. The division also won a Certificate of Achievement in the 1945-1946 Paper Industry Safety Contest conducted by the National Safety Council



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There is no other unit like the ALL PURPOSE Ball Bearing ROTARY UNION. Exclusive design features, plus advanced manufacturing methods and use of special materials, make the ROTARY UNION the most efficient and most economical device for its purpose that is available on the market. Ask for your copy of Engineering Catalog No. 350.

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BELT LACING and FASTENERS for transmission and conveyor belts

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STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

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BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

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PERSONALS

K-C PROMOTIONS AT BADGER-GLOBE MILL

Promotions made by the Kimberly-Clark Corporation at its Badger-Globe mill have advanced Arthur Croxson to the staff of the planning department from his former position as planning superintendent.

Mark Jorgensen is now in the staff materials department, having been a shipping foreman, and Harry Nelson has assumed the foremanship of the shipping section.

Temporary superintendent of the manufacturing department is Bernard Nobbe, who has taken over the duties of Jim Hill, who is now with the operating staff department.

Former day foreman of manufacturing, Lester Johnson, is now planning superintendent, and Ruben Vogel is the new maintenance co-ordinator for manufacturing, replacing George Wingrove, Sr., who retired recently.

◆

EASTMAN PROMOTES SEVEN IN PAPER MFG. DIVISION

Promotion of seven Eastman Kodak Company executives associated with the manufacture of photographic paper has been announced by Charles K. Flint, general manager of Kodak Park.

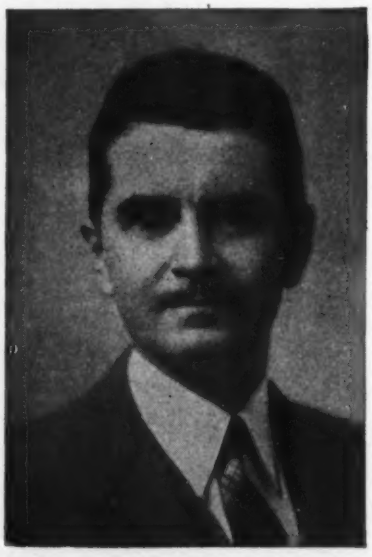
Gerould T. Lane has been appointed assistant manager of Kodak Park, the company's film- and paper-manufacturing division. He has been general manager of the paper division since 1939. Mr. Lane became associated with Kodak in 1918, following five years with the B. D. Rising Paper Company. In 1929, he became superintendent of the paper mills, during which period Kodak developed its photographic paper with purified spruce fiber as a base instead of rags.

Donald B. Kimball, formerly superintendent of the paper mills, has been designated assistant general superintendent of paper departments. Kenneth J. Mackenzie, formerly assistant superintendent of the paper mills, was promoted to superintendent. George A. Richter, formerly assistant superintendent, wood cellulose division, was appointed superintendent of wood cellulose development. Geoffrey Broughton was appointed assistant superintendent of the paper service department, technical development section; Harry E. Smith was named assistant superintendent of the paper service department, product control section; and Ralph W. Peters became assistant superintendent of paper mills.

◆

E. P. McGINN NOW WITH SUTHERLAND REFINER CORP.

Known to his many friends in the paper industry as "Pat," E. P. McGinn recently joined the sales engineering staff of the Sutherland Refiner Corporation, Trenton, New Jersey. Mr.



E. P. McGinn

McGinn was formerly chief chemist for the Paper Division of the National Oil Products Company (now known as the NOPCO Chemical Company), Harrison, New Jersey.

Preceding his association with NOPCO, Mr. McGinn was pulp research supervisor for the Minnesota and Ontario Paper Company (International Falls, Minn.) and was paper and board chemist and beater foreman for the Champion Paper & Fibre Company at Canton, North Carolina, and Hamilton, Ohio.

Mr. McGinn's career also included a connection with the St. Regis Paper Company as a paper technologist at Deferiet, New York, as paper tester for the Foster Paper Company at Utica, New York, and as technical foreman for the United States Forestry Service at Park Falls, Wisconsin. Mr. McGinn began his papermaking activities as a graduate of the Pulp and Paper course at Syracuse University.

◆

WILBUR HAYES JOINS STAFF OF CHAS. T. MAIN, INC.

Joining the staff of Chas. T. Main, Incorporated, Boston, Wilbur Hayes brings to his new post a wealth of paper mill experience.

Mr. Hayes has been associated with the Minnesota and Ontario Paper Company, International Falls, Minnesota, since 1944 as plant engineer. Previous to his employment with MANDO, he had been plant engineer at the Rhinelander Paper Company (Rhinelander, Wis.), and from 1927 to 1933, Mr. Hayes had been in charge of the chemical laboratories of the Consolidated Water Power and Paper Company at Stevens Point and Appleton, Wisconsin.

Mr. Hayes is a graduate of the University of California and a member of TAPPI.

◆

FOUR HUDSON DIVISIONS TO BE SUPERVISED BY ANTON LUND, NOW COMPANY V.P.

Announcement from the Hudson Pulp and Paper Corporation, New York City, states that Anton M. Lund has been named vice president in charge of production. It is also stated that Mr. Lund's duties will be to supervise production at the company's four mills:

Moore & Thompson Division, Bellows Falls, Vermont; Kennebec Division, Augusta, Maine; Mazer Paper Mill Division, Lansdowne, Pennsylvania, and the new $6,000,000 mill under construction at Palatka, Florida.

Mr. Lund is a native of Norway where he began his paper-mill career. He came to this country in 1925 and became associated with Saranac Pulp and Paper Company as superintendent. In 1932, Mr. Lund joined the Hudson

This headbox stands on its own feet

MONEL HEADBOXES are now standard equipment for Fourdrinier wet ends at plant of The Crane Company, Dalton, Mass. *Fabrication and installation by The Berkshire Sheet Metal Works, Pittsfield, Mass.*

Entirely self-supporting, it's another example of Monel's many wet end uses

Headbox problems are few in The Crane Company's mill at Dalton, Mass.

For Crane has standardized on Monel.*

And Monel headboxes are installed in one piece. They're *self-supporting*. They stay tight and don't leak.

They have no wood joints to swell and spring out of place. They need no protective paint. No preservative of *any* kind.

Smooth . . . and easily cleaned

Monel is both stronger and tougher than mild steel. It resists corrosion by paper stocks and white waters. Its surfaces stay smooth, and never give slime and fibre accumulations a chance to dig in and hang on. That's why it's so easy to keep Monel headboxes slick and clean merely by rinsing them with a fresh water hose.

Readily fabricated

Monel presents no problems to experienced fabricators. They can do almost anything with it. For example, The Berkshire Sheet Metal Works, Pittsfield, Mass., cut, bent and welded this headbox by commonly used methods.

For other jobs too

Because Monel shows no galvanic reaction with copper or brass parts, it has many uses throughout the wet end. Specify it for save-all pans and trays, suction boxes, rods, rolls, rails, fastenings, doctors and slices, as well as for headboxes. Let Monel help make *all* your equipment long-lasting and trouble-free.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET, NEW YORK 5, N. Y.

MONEL

NICKEL (INCO) ALLOYS

MONEL* • "K" MONEL* • "R" MONEL* • "KR" MONEL* • "S" MONEL*
INCONEL* • NICKEL • "L" NICKEL* • "Z" NICKEL* *Reg. U. S. Pat. Off.

organization as superintendent of the Lansdowne plant. He later supervised production of that plant and at Bellows Falls, Vermont. Subsequently, he was made manager of the Augusta, Maine, mill.

Mr. Lund is an active member of the Technical Association of the Pulp and Paper Industry.

◆

H&W HONORS BOARD CHAIRMAN MADDEN FOR SIXTY-YEAR RECORD

M. L. Madden, chairman of the board of the Hollingsworth & Whitney Company, Boston, was honored by directors of the company at a lunch-

M. L. Madden

eon held at the Parker House upon the anniversary of his sixty-years service with the organization.

Mr. Madden joined H & W in 1887. He served in most of the company's departments becoming a vice president in 1911, president in 1931, and chairman of the board in 1945. During these many years, he has watched the daily output of the firm rise from twenty tons to five hundred tons. At the present time Mr. Madden is in his eightieth year and is still active in the daily business operation of the company.

◆

▶▶▶ The December (1946) issue of *The Log*, published by The Champion Paper and Fibre Company, Hamilton, Ohio, carried the announcement that *G. W. Phillips* was severing his association with the Champion organization as the editor of that publication. *Cal Skillman*, who has been connected with the Activities Department of the Hamilton Division, is the new editor. Hereafter, *The Log* will be published in Cincinnati.

▶▶▶ District manager of the company's Detroit office is the new position to which *Gilbert E. Collyer* has been advanced by the H. K. Porter Company, Incorporated. Mr. Collyer formerly was located in the company's home office at Pittsburgh, where he specialized in several kinds of equipment including that used by the process industries. The Porter company's Detroit office is located at 642 Book Building.

◆

▶▶▶ Head of the kraft paper department of West Virginia Pulp and Paper Company, *L. E. Van Sickle* retired on January 1 after 45 years of service with the company. Mr. Van Sickle had the longest service record with the company among 187 employees in the New York office and had been head of the kraft paper department for 25 years. A luncheon given in his honor was attended by Thomas Luke, chairman of the board, and other company officials. His successor, *Alfred S. Nalle*, has been with the company 17 years.

◆

JOHN P. KENNEDY IS NOW WITH LION MATCH COMPANY

After an association of twenty-nine years with the American Writing Paper Corporation, Holyoke, Massachusetts, and its predecessors, John P. Kennedy resigned last November (Cf. P.I. and P.W. Nov., 1946).

Mr. Kennedy has now become affiliated with the Lion Match Company, Long Island City, New York, but will maintain his residence in Holyoke for the present. In his new duties, he will be associated with the office of Serge B. Bazavoff, vice president and general manager.

John Kennedy

HYSTER APPOINTS DAN J. SHEEHAN AS MANAGER OF DANVILLE (ILL.) PLANT

The Hyster Company announces through its eastern division manager, Frank L. Ross, of Peoria, that Dan J. Sheehan has been appointed manager of its Danville, Illinois, plant.

Dan J. Sheehan

Mr. Sheehan has been superintendent of motive power for the Chicago and Eastern Illinois Railroad in Danville for the past 14 years. He received his mechanical degree at the University of Michigan and for three years taught the subject as a member of the faculty of Purdue University. He is a member of the American Society of Mechanical Engineers.

◆

▶▶▶ The southeastern coastal states and part of Philadelphia will be served by *John H. McMillan* who will be sales representative for the Pigment Department of the E. I. duPont de Nemours and Company (Incorporated). Mr. McMillan has been connected with the pigments plant in Newark, New Jersey, and has worked as a research chemist since 1935. *Don C. Booth* will serve in the same territory representing the DuPont company's white pigment line. Mr. McMillan will specialize in pigment colors.

◆

▶▶▶ Retired as president of Dartmouth College in November, 1945, *Ernest M. Hopkins* has recently been named to the board of directors of the Brown Company, Berlin, New Hampshire. In addition to his duties with the board, Mr. Hopkins will continue as one of three trustees under the voting trust for the company's preferred and common stock.

YOU HELP ALL 3 WITH THE P. S. P.

● Participants in the Payroll Savings Plan benefit directly in terms of cash—because U. S. Savings Bonds at maturity pay $4 for every $3 invested.

Your company, your community, and your country benefit indirectly in terms of security—because: (1) Employees with a solid stake in the future are likely to be stable, productive workers. (2) The Bond-buying habit of local citizen-employees means a reserve of future purchasing power—a safeguard for the stability of your community. (3) Every Bond bought temporarily absorbs surplus funds and helps check inflationary tendencies.

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ARE YOU USING THESE BOOKLETS?

If not, or if you wish additional copies, just ask your State Director of the Treasury Department Savings Bonds Division.

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This Time It's For You—A booklet for employees . . . explaining graphically how the payroll savings plan works . . . goals to save for, and how to reach them with Savings Bonds.

The Treasury Department acknowledges with appreciation the publication of this message by

The Paper Industry and Paper World

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council

HOLLINGSWORTH & WHITNEY APPOINT JACK B. COWIE AS NEW SALES MANAGER

Appointment of Jack B. Cowie as sales manager for the Hollingsworth & Whitney Company, Boston, became effective December 1. Mr. Cowie joined the company in 1930 after several years in paper mill selling. Since 1943 he has occupied the position of New York sales manager.

Mr. Cowie is well known in the paper industry throughout New England, Metropolitan, and South Atlantic areas. He will continue to make his headquarters in the company's New York office.

◆

▶▶▶ Succeeding *Howard C. Kaiser,* who has retired, *Peter Lehmann* of Pittsfield, Massachusetts, has been appointed master mechanic and superintendent of maintenance of the L. L. Brown Paper Company of Adams, Massachusetts. Mr. Lehmann previously was employed by the General Electric Company.

◆

▶▶▶ Former district representative for the Stevens and Thompson Paper Company, Greenwich, New York, in charge of the Pennsylvania and Ohio territory, *Robert L. Wagner,* has been promoted to the position of assistant sales manager and will make his headquarters in the home office of the company. In his new position, Mr. Wagner will be in charge of the development and sale of new products.

◆

▶▶▶ The problems of market research and analysis which confront the New Products and Market Analysis Division of the Brown Company (mills at Berlin, N. H.) are the special study of *John W. Noble,* who recently joined the Brown organization.

◆

▶▶▶ Formerly manager of the sales research division of the Hercules Powder Company, *Dr. John M. Long* has been named special assistant to the general manager of the Paper Makers Chemical Department.

◆

▶▶▶ Promotions of personnel have been announced by New York & Pennsylvania Company, Lock Haven, Pennsylvania. *Gibson P. Stouck* has been advanced to assistant manager of both the company's mills, *Frank J. Flaig* and *Emil Colquist* have been named mill superintendents, and *Herman Uebel* has been promoted from assistant supervisor to supervisor in the paper manufacturing department.

ROTARY STEAM JACKETED PUMPS

A high grade Pump proven over a long period of time. Will efficiently handle:

CONCENTRATED BLACK LIQUOR
HOT FILLED ASPHALT
HOT TARS
LUBRICATING OILS
(LIGHT AND HEAVY)
CRUDE OILS
VEGETABLE OILS
PAINTS
ALL OTHER KINDS OF VISCOUS MATERIALS
where steam-jacketing is necessary for smooth operation

Rugged Construction — Smooth and Quiet Operation
High Efficiency Assures Low Power Cost

MANUFACTURED BY
ROOFING MACHINERY MFG. CO.
FACTORY & OFFICE—1130 CORNELIA AVE.
Phones: LAKeview 3231 CHICAGO, ILLINOIS

D. W. DAVIS WILL DIRECT FOOD PACKAGING RESEARCH FOR MARATHON CORPORATION

Planning and research in the field of food packaging carried on by the Marathon Corporation, Menasha, Wisconsin, will be directed by D. W. Davis, who has been appointed director of research in this division.

Mr. Davis has been actively engaged in research work for the Marathon Corporation for over five years. His first association was with the company's Rothschild, Wisconsin, division, and in 1944 he became connected with the Menasha converting division. Prior to his service with Marathon, Mr. Davis was with the DuPont company as a research chemist.

◆

▶▶▶ New York Sales Offices of the Ohio Boxboard Company will be managed by *Lockwood C. Barr,* who was formerly connected with the Robert Gair Company. Mr. Barr assumes his new position after three years service as a Lieutenant in the Navy.

◆

L. ROBINSON RETIRES FROM SMITH PAPER, INCORPORATED

Foreman in the pulp department of Smith Paper, Incorporated, Lee, Massachusetts, Lucius Robinson, has retired after nineteen years of service. At a banquet given in his honor, officials of the company and fellow employees presented Mr. Robinson with a purse, token of his faithful service.

Mr. Robinson is the grandson of the elder Lucius Robinson who was once governor of New York. He was born in Elmira and studied engineering at Cornell University. Before joining the Smith organization, Mr. Robinson was employed by the Rising Paper Company of Housatonic, Massachusetts.

◆

▶▶▶ Appointment of *Francis J. Wakem* as vice president of the Johns-Manville Sales Corporation, New York City, has been announced. Mr. Wakem began his career with Johns-Manville in 1921. In addition to his new executive duties he will continue to act as merchandise manager of the Industrial Products Division.

◆

▶▶▶ Vice president and technical director of the Monsanto Chemical Company, *Dr. Charles Allen Thomas,* was elected president of the American Chemical Society, December 20. Dr. Thomas is among the key figures in the atomic energy development. The Clinton Laboratories, Oak Ridge, Tennessee, where the first experimental quantities of plutonium were produced

ATKINS
Paper Knives

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Atkins Paper Knives have keener edges—*and hold them longer.* That's why keen buyers everywhere always specify Atkins. They know that these Knives are made of finest alloy steel . . . are scientifically heat treated and tempered . . . are ground to razor-keenness. They also know that Atkins Paper Knives require fewer trips to the grinder.

And that's why you'll be a canny buyer when you insist on Atkins. You'll be asking for knives that have *proved* their ability to give double or more the service of ordinary knives—that will cut cleaner and smoother, over longer cutting periods than you ever dared hope possible. If quality and performance count, you'll specify Atkins Paper Knives from now on.

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Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of

- PULP AND PAPER MILLS AND OTHER INDUSTRIAL PLANTS
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"READY DRESSED" MILL COGS
LABOR SAVING — TIME SAVING

The Most Economical Filling That Can Be Put in a Mortise Wheel.

We Make Any Style or Size Wanted.

Write for Instruction Sheet "Q" Which Is Free.

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., South Bend, Ind.

ENGLISH ECCO CLAYS TRADE MARK CLAYS

UNIFORM • SUPERIOR • DEPENDABLE

English China Clays Sales Corporation
551 Fifth Avenue, New York City

were under his direction in 1945. Following the end of the war Dr. Thomas continued at the laboratories directing the reconversion of the atomic energy to peacetime uses.

◆

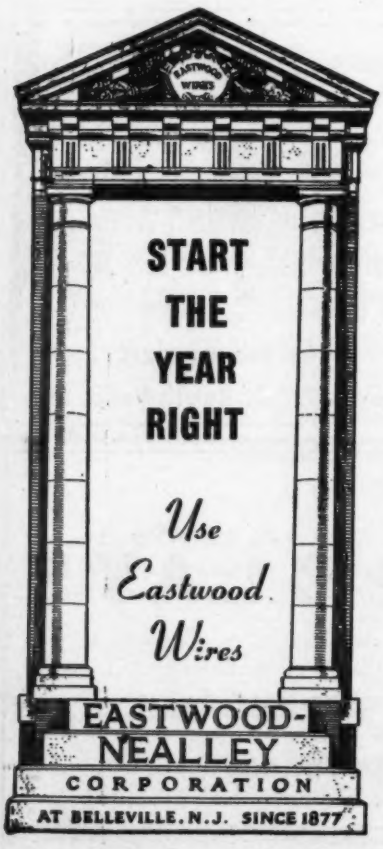
▶▶▶ Long-time publicity expert and free lance writer, *Arthur Tuckerman* has been named director of public relations for the American Car and Foundry Company, New York City. Mr. Tuckerman joins the staff of ACF as assistant to executive vice president in charge of publicity, *Charles J. Hardy, Jr.*

◆

▶▶▶ On January 1, *William J. Austin*, director of purchases for the Hercules Powder Company, Wilmington, Delaware, since 1942, retired. He is succeeded by *Andrew VanBeek*, who has been associated with Hercules since 1927 and was made assistant director of purchases during 1946.

◆

▶▶▶ Chief engineer of the Towmotor Corporation, Cleveland, will be *Lee C. Daniels* who was formerly associated with The Oliver Corporation, The Cleveland Tractor Company, The Twin Coach Company, and the White Motor Company.



▶▶▶ Sales manager for the mill division of the Gaylord Container Corporation (St. Louis, Mo.) will be *Leslie W. Gould*, who succeeds Otto P. Carter (See Necrology). Mr. Gould will be assisted in the management of the sales functions of the mill division by *M. L. Wuescher.*

◆

▶▶▶ Joining the staff of the labor relations counseling division of the National Foremen's Institute, Incorporated, *Thomas A. Knowlton* has become an associate of the organization. Mr. Knowlton has had eight years experience with the Federal Government as a field examiner for the National Labor Relations Board.

NECROLOGY

JACOB KINDLEBERGER

The passing of the founder and chairman of the board of Kalamazoo Vegetable Parchment Company on New Year's Day closed the last chapter in the life story of one of the paper industry's most exemplary and best loved leaders.

Jacob Kindleberger was nearing his seventy-second birthday—he was born February 27, 1875, in Alsace-Lorraine. His parents emigrated to the United States in 1880 and settled in Ohio. His early life was fraught with many hardships, and at the age of ten he began to work in a paper mill as a rag sorter. Many questions and ideas about papermaking took hold of him during his formative years, and he never outgrew a determination to grow and progress with the paper industry even against tremendous odds.

Although handicapped by poor eyesight, Jacob Kindleberger worked to prepare himself for college and attended Ohio Wesleyan for three years when he was compelled to give up school work on account of eye strain. With one purpose in mind, he advanced slowly, but steadily, until 1909 when he became convinced that Kalamazoo, Michigan, was a promising location for a converting mill for parchment paper. The town also had prospects of becoming a papermaking center. Mr. Kindleberger interested several men in his proposition to organize a paper company and they raised a starting capital of $50,000. The record states that J. J. Knight was the first associate to join him with $10,000.

The early days of the little company were rugged times. The only facilities available were the properties of an abandoned beet sugar plant near the Kalamazoo River, just out of Kalamazoo. But those men were all true pioneers and their courage in those early days will always be a part of the company's history and will be pointed to with pride whenever the company passes a new milestone.

Mr. Kindleberger's devotion to a purpose and the principles by which

Jacob Kindleberger

he lived to reach that goal will be told to the aspiring youth of coming generations. As a boy he worked for 25 cents a day—hardly lunch money in these inflationary times. Later, when he was making $100 a week on a selling job, he gave it up in order that he might return to his former paper mill employer and a wage of $15 per week.

"Uncle Jake," as he was lovingly known to his employees and associates, felt a personal responsibility for the welfare and happiness of his people. With this in mind he built a community around the great industrial plant of KVP which has compounded the monetary investment many times.

A few months ago, the KVP Company opened its new plant at Espanola, Ontario. Mr. Kindleberger envisioned this expansion and began negotiations on the project before he was compelled to become inactive in administration matters.

Surviving are the widow and a son, Joseph B. Kindleberger, a vice president of KVP Company.

◆

▶▶▶ Formerly plant superintendent for E. D. Jones & Sons Company, Pittsfield, Massachusetts, and in recent years expediter for the organization,

Faster production of Better Rolls

CAMACHINE 18

For paper and paperboard. Web widths 73" to 162" on paper, 73" to 142" on board. Speeds up to 2000 fpm on paper, 1200 fpm on board.

CAMACHINE 10-14D

Converts wide webs of paper or board into narrow rolls up to 72" diameter. Speeds up to 1500 fpm on paper, 1000 fpm on board.

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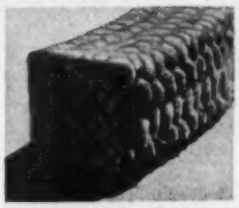
61 POPLAR STREET, BROOKLYN 2, N. Y.
MIDWEST OFFICE: 111 W. MONROE ST., CHICAGO 3, ILL.

These Braiding Machines (exclusively Garlock) make a

Better Braided Packing



Cross section, showing unique structural design.

GARLOCK 731 Lattice Braid Coil

A battery of specially designed machines braids strands *through and through* in an entirely new and different way in the manufacture of the exclusive patented GARLOCK *Lattice-Braid* packing. All the braided strands are lattice-linked together into one structural unit. *Lattice-Braid* packing is manufactured of asbestos, flax or cotton for various types of service. Write for descriptive folder.

THE GARLOCK PACKING COMPANY
PALMYRA, N. Y.

In Canada: The Garlock Packing Company of Canada Ltd., Montreal, Que.

60th Anniversary 1887—1947

GARLOCK
Lattice-Braid
PACKING

Henry M. Bostley, passed away recently. Mr. Bostley had been associated with the Jones organization for forty-five years.

◆

▶▶▶ Founder and vice president of the Morris Paper Mills (Morris, Ill.), *Jacob C. Godhelp*, passed away at Chicago, December 19.

◆

HENRY J. BERGER

For many years editor of the *Paper Trade Journal*, Henry J. Berger passed away on Christmas Eve at his home in Beacon, New York. He was seventy-four years of age.

During his lifetime, Mr. Berger had been connected with publications in the paper industry field. His early experience was in newspaper work and in editing the *American Stationer*. In 1916, Mr. Berger became editor of the *Paper Trade Journal* and retired from this work in June, 1946.

◆

▶▶▶ For forty-three years connected with the Gardner Richardson Company, *William A. Mullenix* passed away on December 9, at Cincinnati, Ohio, at the age of 67. When he retired two years ago, he was paper mill foreman.

GUARANTEED EQUIPMENT
CHICAGO ELECTRIC

Motor-Generator Sets

KW	Make	A.C.	D.C.
1000	Gen. Elec.	3/60/2300	600
800	Westing.	3/60/13200	240
500	Gen. Elec.	3/25/6600	250
150	Gen. Elec.	3/60/2200	275
75	Westing.	3/60/440	250

Synchronous Motors

HP	Make	Volts	Speed
750	Gen. Elec.	440	600
600	Westing.	2300	450
400	Westing.	208	1200
400	Gen. Elec.	2300	600
270	Gen. Elec.	440	600
75	Gen. Eelc.	440	1200
60	Gen. Elec.	220	1200
15	Century	208	1200

Transformers

KVA	Make	Primary	Secondary
300	Wagner	7200/12470	230/460
250	Gen. Elec.	6600	240/480
100	Westing.	240/480	110/220
75	Westing.	3810	122/244
37½	Moloney dry.	240/480	240/120
37½	Sorgel dry.	240/480	240/120

Also Hoists, Generators, Switchboards.

Chicago Electric Co.
Distributors—Rebuilders—Engineers
1313 West 22nd Street
Chicago 8, Illinois

▶▶▶ Chief engineer of the Centrifugal Pump and Compressor Department, De Laval Steam Turbine Company, Trenton, New Jersey, *Arvid Peterson* passed away December 19. Mr. Peterson entered the employ of De Laval in 1907 after coming to this country from Sweden in 1905. For twenty-years he had held the position of chief engineer, and he had gained recognition as a leading technician in his field.

◆

▶▶▶ Sales manager for the mill division (Kraft Bags and Wrapping Paper) of the Gaylord Container Corporation, St. Louis, Missouri, *Otto P. Carter*, passed away late in November. Mr. Carter was associated with Gaylord for twenty-five years, and was widely known in the paper and packaging industries.

◆

M. J. KETTER

When he retired from Hoberg Paper Mills, Green Bay, Wisconsin, the middle part of last year, M. J. Ketter had been with the company 38 years. Mr. Ketter passed away December 16 at the age of 70.

Before he became associated with Hoberg, Mr. Ketter was employed as millwright at Northern Paper Mills, also at the Nekoosa-Edwards Paper Company. He worked his way up at Hoberg until he was general superintendent in 1939. About that time, it was necessary for him to take over work that was somewhat easier. He remained on the job as special consultant and took charge of the company's suggestion system. He was doing that work when he retired.

◆

▶▶▶ For many years general manager of the Pejepscot Paper Company of Brunswick, Maine, *William W. Nearing*, passed away December 27. Mr. Nearing was eight-two years, and he had retired from the Pejepscot organization in 1923.

◆

GEORGE H. ELLIS

Inventor and veteran member of the Minnesota and Ontario Paper Company, George H. Ellis, passed away November 23, at Orlando, Florida, where he has made his home for the past several years.

Although in his eightieth year and retired from active duty with MANDO, Mr. Ellis continued to be a member of the company's research department until his passing. He had been consultant engineer for the Insulite Division since 1924. During his career in the paper industry he had been closely associated with the manufacturers of insulation board since 1906 when he invented structural insulation.

Mr. Ellis was known for his work in both the insulation and farm machinery fields, and is credited with 151 patents, more than a hundred of which are actively used today.

◆

▶▶▶ Retired president of the Mid-States Gummed Paper Company, *Gleyn F. Wallenbrock*, passed away December 21. Entering the paper business as a salesman for the Graham Paper Company 23 years ago, Mr. Wallenbrock had also been associated with the Mississippi Valley Paper Company before going with Mid-States.

◆

CHARLES BURTON THWING

Pioneer in the field of pyrometry and president of the Thwing-Albert Instrument Company, Philadelphia, Charles Burton Thwing passed away December 12, in his eighty-seventh year.

Dr. Thwing was born March 9, 1860, at Theresa, New York, and after graduating from Northwestern University and the University of Bonn, Germany, he spent some time in the field of education. Entering into business and industry, Dr. Thwing became eminent in the field of physics and was known for his patents in thermo-electricity.

Included in Dr. Thwing's research was his early work in the development of the electric light and wireless. Thwing's Law on capacity was another of his achievements from the study of electronics.

◆

▶▶▶ Founder and president of the company bearing his name, *Robert Wilson* passed away on December 6, at his home in the Bronx, New York. Mr. Wilson was in his sixty-seventh year and had, for forty years, been closely associated with the paper industry. In 1918 he left the R. P. Andrews Company to found his own concern, the Robert Wilson Paper Corporation.

◆

▶▶▶ Widely known in paper mill circles, *Guy Waldo* passed away December 28, 1946. Mr. Waldo was associated with Flambeau Paper Company, Park Falls, Wisconsin, for many years; he was manager of that company from 1905 until 1935 when he resigned. Later he was connected with Whitmore Machine and Foundry Company, Menasha, Wisconsin, and Thilmany Pulp & Paper Company, Kaukauna, Wisconsin. He resigned from the latter company in 1944.

Here's Why GK KNIFE GRINDERS can "TAKE IT"

The extra-heavy cabinet type base and table provides a solid, vibrationless support for grinding knives and shear blades to close tolerances.

These massive, precise castings are the secret of the GK Knife Grinder's all-out durability—the real reason why it stands up under gruelling production schedules hour after hour, without dropping a hairline in accuracy! On the GK, there's no chance of a poor grinding job, due to vibration or chatter.

The new GK is completely automatic . . . no skilled operator needed. Simple design . . . for minimum maintenance. All feed works grouped in a single unit, mounted in front . . . for easy, quick inspection. All moving parts run in a constant oil bath.

Perhaps the GK is the answer to your knife maintenance problems. Why not write Hanchett engineers today, for their advice? No obligation, of course. And ask for Bulletin 147-PW, for complete details.

The GK Knife Grinder is available with Hydraulic Drive, as shown here or with Mechanical Table Traverse.

★ ELECTRIC BRAZERS
★ ANVILS AND HAMMERS
★ BAND WHEEL GRINDERS
★ MISCELLANEOUS SAW & KNIFE FITTING EQUIPMENT

HANCHETT MANUFACTURING CO.
SAW AND KNIFE FITTING MACHINE DIVISION
BIG RAPIDS, MICHIGAN U.S.A.

★ SAW SHARPENERS
★ SAW STRETCHERS
★ KNIFE GRINDERS
★ SWAGES AND SHAPERS
★ WELDING CLAMPS

REMOVE SCALE, SLUDGE, RUST

and other accumulation . . . with AURAND CLEANING TOOLS

FOR ANY HARD SURFACE: IRON — STEEL — BRICK — CONCRETE — ETC.

It's easy to remove paint, scale, rust and other accumulations with AURAND Cleaning Tools. Powered, rotary chipping does a thorough cleaning job in less time. No special skill required. Even depth surface is assured by an adjustable shoe control. Cutter heads are renewable.

For further information write Dept. 649.

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How to Clean Holding Chests — Speedily!

Your cleaning procedures need not be a time-consuming headache. Take the tough job of cleaning holding chests, for example. By applying recommended Oakite cleaning materials with the Oakite Cleaning Gun, you easily remove slime, grease and similar accumulations; completely condition chests for peak operating efficiency. That's because the Gun combines heat with force and intensifies the detergency of Oakite compounds to blast off hampering deposits in jig time.

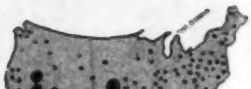
To get the whole story just ask your nearby Oakite Technical Service Representative about Oakite Steam-Detergent Cleaning. He'll show you how it can speed-up countless cleaning jobs in your mill. Or, write us for details!

OAKITE PRODUCTS, INC., 18 Thames St., NEW YORK 6, N.Y.
Technical Representatives in Principal Cities of U.S. & Canada

MATERIALS
METHODS
SERVICE

OAKITE

Specialized Industrial Cleaning



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Lunkenheimer Distributors are located in principal industrial centers. They are important links in the Lunkenheimer chain of better, more efficient valve service—service that can save you time, trouble, and money. Our Distributor nearest you can supply you with Lunkenheimer precision-made, perfect-fitting parts, and will gladly help you solve problems of valve maintenance or operations.

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TEN THOUSANDTHS OF AN INCH

If parts do not measure up to the stringent requirements for accuracy, they never enter a Lunkenheimer Valve and never become part of a Lunkenheimer Distributor's stock.

. . . require fewer replacements
. . . cost less per year of service

In every respect—quality of materials, advanced design, finest precision workmanship—Lunkenheimer Valves are built to provide *longer* as well as more efficient and reliable service.

One or two new parts at long intervals make a correctly engineered, ruggedly constructed Lunkenheimer Valve as good as new. All Lunkenheimer parts are precision-made . . . perfectly matched . . . *requiring no special fitting on the job.*

Thus, when you install Lunkenheimer Valves you can look forward to purchasing fewer replacement valves . . . and to easier, lower-cost replacement of present valves with parts quickly obtainable from your nearest Lunkenheimer Distributor.

Remember—in utmost economy plus superior efficiency, Lunkenheimer products offer you *greater value per valve dollar.*

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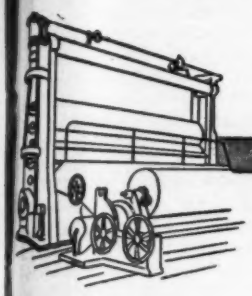
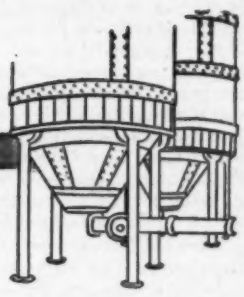


Practical SHORTS



Readers are invited to submit short, practical articles for this department. The items should be original and should relate to ways and means of handling production and maintenance jobs. Where possible, articles should be illustrated. Rough sketches only are required. Payment will be made for acceptable items upon publication.

Correct Usage and Care of Chisels

Cold chisels are used for cutting metal. The one most generally used is the flat cold chisel. The mechanic has need for this tool to cut rivets, cut thin metal sheets, chip metal and to split nuts.

Chisels are made from tough, high carbon steel. Usually the bar stock from which the chisel is forged is octagonal (eight-sided) but may be hexagonal (six-sided), round, square or rectangular. The width of the cutting edge of a cold chisel denotes its size.

COLD CHISEL

CAPE CHISEL

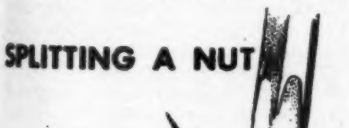
ROUND NOSE CHISEL

DIAMOND POINT CHISEL

In addition to flat cold chisels, there are several other types which sometimes are very useful in general repair work.

The cape chisel which is quite narrow in width is used to cut keyways, narrow grooves and square corners.

The round nose chisel is used for cutting semicircular grooves and chipping inside corners which have a fillet or radius.



The diamond point chisel is made square at the point, then ground on an angle across diagonal corners which makes the cutting face diamond-shaped. It is used for cutting "V" grooves and square corners.

After the cutting edge of a cold chisel is correctly formed by grinding, it is hardened and then tempered. Hardening the chisel gives it the property of being able to cut metal. But after it is hardened, it must be tempered. Otherwise, the cutting edge would be so brittle that it would probably break the first time it was used.

There are a number of important things to remember about chisels—

Always use a chisel that is big enough for the job.

Use a hammer that is heavy enough for the size of the chisel—the larger the chisel, the heavier the hammer.

Ordinarily a chisel should be held in the left hand with the thumb and first finger about an inch from upper end of the chisel. Hold the chisel with a steady but rather loose grip with finger muscles relaxed. That way, if you miss the chisel with the hammer and strike your hand it will slide down the chisel and lessen the effect of the hammer blow on your hand. The best thing to do, of course, is not to miss hitting the chisel.

When chipping metal, the depth of the cut is controlled by the angle at which

TO CUT OFF A LARGE RIVET HEAD, FIRST CUT GROOVE THROUGH CENTER OF RIVET HEAD WITH CAPE CHISEL AS SHOWN IN A. THEN CUT OFF HEAD WITH FLAT CHISEL AS SHOWN IN B.

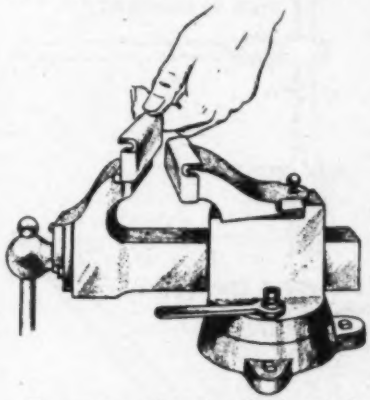
you hold the chisel. Don't try to take too deep a cut. For rough cuts, one-sixteenth of an inch is enough, with half that much or less for finishing cuts.

Keep your eyes on the cutting edge of the chisel. Swing the hammer in the same plane as the body of the chisel. Strike one or two light blows to check your "swing," then increase the force as required.

When using a chisel for chipping, always wear goggles to protect your eyes. If there are other men close by, see that they wear goggles or are protected from flying chips, or else put up a screen or shield to keep the chips from hitting anyone. These two precautions can save many a man from losing the sight of an eye. Remember that the time to take these precautions is before you start the job. After a person is injured, it's too late.

If you are using a chisel on a small piece, clamp it rigidly in a vise. Chip toward the solid or stationary jaw of the vise. Chip in a direction away from, never toward, yourself.

To avoid marring or otherwise damaging finished surfaces on a piece which has to be clamped in a vise with roughened jaws, use copper jaw covers. These are frequently called "soft jaws" or "caps."



The cutting edge of a chisel must be sharp in order to cut. It is sharpened by dressing it on an emery wheel. When sharpening a chisel, try to maintain the original angle of the cutting edge by grinding only a small amount at a time from each side. Hold the chisel against the wheel with very little pressure to avoid overheating and dip the cutting end of the chisel in water often enough to keep it cool. Otherwise you will draw the temper and the cutting edge will be soft and the chisel useless until it is rehardened and tempered. This is a job that can be done only by an experienced heat-treater. The cutting edge should be ground on a slight radius—higher in the center than at the ends.

After dressing the cutting edge of a chisel on an emery wheel, inspect the other end. Sometimes it becomes upset or

BEFORE AND AFTER DRESSING

"mushroomed"—spread out like an umbrella—as a result of hammering. It's dangerous to hammer on a chisel or punch which has been upset. Pieces may fly off and cause injury. Grind off the upset metal so the end of the chisel will be slightly tapering and comparatively flat across the top.

Flat cold chisels are the ones most frequently used by mechanics but the other types mentioned have helped many a me-

chanic out of a "tight spot" when the right tools to do the job were not at hand.

For example, there are several types of extractors for removing broken studs—the portion of the stud remaining in the part after the stud has been twisted in two. If you have to remove a broken stud and have a set of these extractors, the job will be comparatively simple. If you don't have the extractor, the broken stud can be removed with the aid of a chisel.

Here are two methods—"tricks of the trade"—which are useful in such cases.

In either case, you put a center punch mark exactly in the center of the stud, then drill a small hole down into the stud. Follow with one or two larger size drills so that practically all that remains

of the stud is a thin sleeve with the threads on it. Do not use a drill so large that it will cut into the threads. Next use a diamond point chisel and lightly tap it into the hole. Put an adjustable wrench on the square of the chisel and back out the broken stud.

If a diamond point chisel of the correct size is not available, you can use a round nose chisel and start breaking the stud threads out of the tapped hole and thus collapse the remaining portion of the stud so that it can be removed.

The diamond point chisel isn't intended for use as a stud extractor, but like many other instances that might be considered as misuse of a tool, it's a way to get the job done if the right tool is not available. There are always some occasions when the proper tool is lacking, or when you do not have the replacement parts necessary to make repairs the way they should be done. Then it is a question of ingenuity. You must use what is available. But you should always be sure that the tool being used as a substitute is used carefully so as not to damage or destroy it.—*ABC's of Hand Tools*, General Motors Corporation.

The Care of Files

File life is greatly shortened by improper care as well as by improper use—and improper selection. Files should never be thrown into a drawer or tool box containing other tools or objects. They should never be laid on top of or stacked against each other. Such treatment ruins the cutting edges of their teeth. Keep them separate—standing with their tangs in a row of holes or hung on a rack by their handles (Figure 1). Keep them in a dry place so rust will not corrode their teeth points.

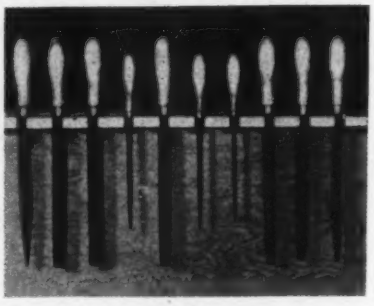


Figure 1

It is also of great importance to keep files clean of filings or "chips," which often collect between the teeth during use. After every few strokes the good mechanic taps the end of the file on the bench to loosen these "chips." And he always has on hand a file card or brush. The teeth of the file should be brushed frequently with this type of cleaner (Figure 2)—and always before putting the file away. Oil or grease on file should be removed with chalk.—Nicholson File Company.

Figure 2

◆

Painting Concrete Floors

Most manufacturers of lead and oil paints make special floor paints in which they embody abrasion-resisting pigments. These are suitable for concrete floors when carefully applied. Paints with a phenol resin base have given good service, as also have a number of paints prepared especially for use on concrete floors. Some of the special floor paints contain rubber, giving a hard, durable surface coating, resistant to water and to the alkali in concrete.

It is essential to have the floor perfectly dry when paint is applied. Basement floors where moisture penetrates the slab from below should not be painted, because the moisture will cause the paint film to peel and chip off. Paint on some basement floors has been unsatisfactory because warm, moisture-laden air condensed on the floor slab before the paint dried. Painting should be done when the atmosphere is dry. New concrete should be thoroughly seasoned and neutralized before paint is applied. The magnesium fluosilicate treatment is recommended. (Apply solution consisting of 2 lb. of magnesium fluosilicate per gallon of water. Allow to dry for at least 48 hours. Remove all protruding crystals by brushing.) because it hardens the floor surface at the same time. The surface should be thoroughly cleaned, oil and grease being removed by scrubbing with gasoline, naphtha or special solvents, which should be allowed to evaporate before painting. Any undue roughness of the surface should be removed with a carborundum brick or coarse emery cloth. Smoothly troweled surfaces should be etched slightly by scrubbing with a 10 per cent muriatic acid solution. The floor should be first dampened, then wetted with the acid solution and scrubbed with fiber brushes. The floor should then be mopped or flushed with water and permitted to dry thoroughly before paint is applied. The hands, shoes and clothing should be protected from the acid.

While most manufacturers recommend 2 coats on concrete floors, experience indicates that 3 coats give results which more than compensate for the extra cost. The first coat should be thinned to secure good penetration. Manufacturer's directions for application should be followed. —Portland Cement Association.

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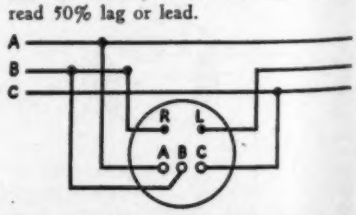
A Simple Method of Checking Power-Factor Meters

In line with periodic checking of instruments, power factor instruments are often neglected by reason of lack of equipment. A simple method of checking electrodynamic type power factor meters without the use of electrical standards and without the removal of the instrument from the board is as follows:

1. By removing lead A from the instrument, and shorting terminals A and B, the instrument should read 50% lag or lead.

2. Next connect a jumper lead from A to C of the instrument. With this connection, the instrument should read unity or 100% power factor.

3. With jumper removed, reconnect lead A to A of the instrument, disconnect lead from C and short circuit terminals B and C at the instrument. With this connection, the instrument should read 50% lag or lead.



The connection of a power-factor meter to a supply line is illustrated. With these connections, the meter will read the power-factor of the line

If these three points check, it can reasonably be assumed that all other points are in calibration.

Slight calibration adjustments may be made by changing balance as this is frequently the reason for calibration changes.

It must be remembered that power factor meters are of the ratio type which operate by the ratio of the forces of opposed coils. Such instruments have no control springs and, when in balance with no coils connected to circuits, the pointer will have no definite position on the scale. In other words, it should remain at rest in any scale position.—WESTINGHOUSE ELECTRIC CORPORATION.

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How to Use Electric Welding Equipment to Thaw Frozen Pipes

The use of electric welding equipment to thaw frozen water pipes requires no special equipment other than reliable pipe clamps for making firm electrical connections. Strap-type clamps of copper having ample section to carry several hundred amperes are desirable. C-clamps may be used to clamp cable terminals directly to the pipe where necessary. A file, rasp, or abrasive cloth may be used to remove zinc oxide, rust, paint, and grease to assure a good electrical contact.

Cable should never be wrapped around the pipe as a connection, since it is practically certain to loosen, and may cause hazardous sparking. Ordinary pipe wrenches are required for disconnecting piping. A portabale voltmeter is useful for checking voltage drops and determining the continuity of circuits.

The connections to the welding generator are made in the ordinary way with the work lead and electrode both connected to the pipe on opposite ends of the frozen section so that the heat generated in the pipe wall by the passage of current will thaw the ice in the pipe. The method of getting at the pipe will vary in almost every case, but for economy, it is desirable to get as close to the frozen portion as is feasible without excessive digging in frozen ground. It is desirable to set the machine at the lowest current output adjustment at the beginning of a thawing interval in order to permit checking connections with the least likelihood of flashing.

While the proper current for thawing pipes has been established as between 200 and 500 amperes, the time needed to complete the job varies greatly according to the size, length, kind, and location of the pipe, condition of the surrounding soil, extent of the freeze, and temperature of the air. Tables I and II will help determine the various factors involved.

While the resistances given are for direct current, the reactance is so small that it can ordinarily be neglected when cables are not coiled. There are so many other variables in a given case that the voltage necessary to produce the current will be, for all practical purposes, the same for both a-c and d-c. Table III shows the maximum outputs which can be obtained from the arc welding equipment which would normally be used for pipe-thawing purposes.

Where welding sets are to be operated at less than 80 per cent of their ampere rating, the operation can be continuous. That is, a 400-ampere d-c set can be operated continuously at 320 amperes without damage. Likewise, a 500-ampere transformer can be operated at 400 amperes continuous. The sets may be operated at their maximum output for intermittent periods up to 15 minutes if sufficient time is allowed for return to normal temperature.

When using arc welding equipment for thawing purposes, there are a number of precautions which must be observed. If a good, low-resistance joint is not obtained between the copper cable and water pipe, excessive heat will be generated at the connection. If the current is allowed to form an arc at this point, it may damage the pipe.

Care should be taken to select the correct amount of current where there is known to be lead in the service pipe, because lead pipes will stand less current than iron. The pipes should be disconnected from the building piping before the wiring so that the current has only one path in which to travel—through the section which is frozen. If this is not done, where other devices are grounded to the water pipes the ground wires may burn out and cause a fire, since the grounding connections will be raised above earth potential.

In using single-operator d-c sets, two points should be noted. The low load voltage will result in the possibility of unusually heavy currents on the lower taps. Since these taps are designed to carry the low currents which will be drawn at normal operating voltages, the result may be to overheat portions of the series field. This can be avoided by setting the units on the highest tap and lowest open-circuit voltage which will give the desired current.

In addition, the low load voltage should be considered in making an estimate of the current setting required. Since load voltages in the neighborhood of 5 or 6 volts will often be encountered, the output current on any setting will be as much as 1½ times the current which would be drawn by a welding arc. With transformers, however, the current drawn by the load will be very nearly that indicated on the nameplate.

As a final precaution, the resistance of the joints in the pipe should be determined. If the joints are insulated by rust or pipe dope, a spark may start a fire.—*R. F. Wyer, Electric Welding Division*, GENERAL ELECTRIC COMPANY.

Table 1

Pipe Diameter in Inches	Recommended Amperes	Approx. Minutes to Thaw	Recommended Cable Size	Resistance per 100 ft. Cable
¼	75	15	No. 6	.0395
½	125	20	No. 2	.0156
¾	200	20	No. 0	.00984
1	250	30	No. 00	.00780
1½	300	30	No. 000	.00619
2	350	40	No. 0000	.00491
4	600	75	400,000 cm	.00270
6	800	120	600,000 cm	.00180

Table 2—Ohm Resistance per 100 Ft. Standard Pipes

Pipe Diameter	Wrought Iron	Steel	Copper Tubing	Lead	Cast Iron Class A
½	.026	.0198	.00824	.0234	——
¾	.0202	.01485	.00445	.01371	——
1	.0138	.0100	.0034	.00984	——
1½	.00842	.00618	.00208	.0064	——
2	.00625	.0046	.00133	.0053	——
4	——	——	——	——	.0092
6	——	——	——	——	.006

Table 3

Equipment	10 Volts	20 Volts	30 Volts	40 Volts
300 amp a-c welders	500 amp	450 amp	400 amp	375 amp
500 amp a-c welders	800 amp	750 amp	700 amp	625 amp
300 amp d-c welders	650 amp	600 amp	500 amp	400 amp
400 amp d-c welders	800 amp	750 amp	700 amp	600 amp
600 amp d-c welders	1200 amp	1000 amp	900 amp	700 amp

Qualifying a Trade-Mark For Registration Under the Lanham Act

EDITOR'S NOTE: The Lanham Act, which becomes law next July, will offer trade-mark owners unprecedented protection against encroachment by others at the same time that it widens the scope of registration. Registering your trade-mark, therefore, will become a practical necessity under the new law.

The following article, part of a 56-page analysis by the Research Institute of America, describes the types of marks that will qualify for the Principal Register. The analysis, "Preparing for the New Trade Mark Law," was written by Walter J. Derenberg, attorney and authority on trade-mark law, in collaboration with the Institute's Board of Editors, headed by Leo M. Cherne. The excerpt is reprinted by permission of the Research Institute of America, 292 Madison Avenue, New York City.

▶▶▶ THERE'S NO CLEAR rule as to what trade-marks can be registered under the Lanham Act which becomes effective next July. Section 11 merely says that the mark "must be capable of distinguishing the applicant's goods."

Both the old and the new laws stress situations where trade-marks either cannot be registered at all or qualify only under exceptional conditions. If you avoid these restrictions, chances are your mark will be approved.

Registering Geographical Names

The Lanham Act makes it easier to use geographical names for trade-marks. Under the present law, names which are "merely geographical" can't be registered, but Section 2e of the Lanham Act allows registration of such marks if they aren't *primarily* geographically descriptive *when applied to the goods that carry them.*

The basic point is that the present law categorically forbids registration of names which are "merely geographical"—but the new law adds the words "as applied to the goods of the applicant." A word like "Vienna" for bread may have no apparent geographical significance when applied to bread manufactured in the U. S.

But the new law (Section 2e) specifically prohibits the use of geographical terms that might deceive the public. For instance, "House of France" or "Parisian" may be refused registration on the ground that they indicate that the trade-marked product originated in France.

Under the Lanham Act, there is likely to be a considerable difference in the treatment of semigeographical words like "Mid-West" and "Old English." These words were not permitted registration under the present law (even though "Mid-West" has been registered on many previous occasions). Under the new act, words like "Globe" as applied to a machine, or "Orient" on a typewriter, will probably be registrable since they can hardly be considered "primarily geographically descriptive" in connection with such articles.

The underlying theory of the ban against names which are "merely geographical" was explained in the following Supreme Court decision: "Could anyone prevent all others from using them, or from selling articles produced in the districts they describe under those applications, it would greatly embarrass trade, and secure exclusive rights to individuals in that which is the common right of many."

Under this rule, words like "Lackawanna" were denied trade-mark protection. But even such geographical names have been judicially recognized and protected despite their unregistrability—in cases of secondary meaning.

Merely Descriptive Marks Not Allowed

Present rules governing the registration of descriptive marks will probably continue. The Lanham Act forbids registration of any mark which "when applicable to the goods of the applicant is merely descriptive or deceptively misdescriptive of them." This undoubtedly includes marks that are descriptive of the goods' character or quality, although the new act—unlike the old—is not specific on this point.

It will probably be harder to register descriptive terms than surnames or geographical names. The latter are rejected only where "primarily" geographical or surnames. But "primarily" descriptive is not the yardstick for rejection. A term will be turned down if it is "merely descriptive." (Efforts in Congress to loosen that criterion by substituting "primarily merely descriptive" were defeated.)

Suggestive vs. Descriptive

If you can prove your mark is actually "suggestive" and not "merely descriptive," you will be safe. But the borderline is narrow.

It is almost impossible to draw the line between "descriptive" and "suggestive." Therefore, in selecting a new trade-mark, you should avoid any term which may be too close to the borderline. This applies to picture trade-marks as well. Above all, don't choose any trade-mark for a new product which might develop into a common noun or generic term, as happened to "Cellophane" and "Shredded Wheat."

Misspelling Is no help

Mere misspelling of an otherwise descriptive term does not make it registrable. Marks like "Rubberoid," "Dioxygen," and "Kantleek" have been thrown out.

Foreign Descriptives Barred, too

Words which are descriptive in a foreign language or even in Latin or Greek can't be registered either. The word "Peaudouce," meaning "softskin" in French, was rejected for a skin lotion. "Dermalait" for a milky skin lotion was also refused because "derma" means skin in Greek and "lait" is French for milk. In one instance, even the word "Saniga," Esperanto for "sanitary," was rejected. There is no reason to suppose the Lanham Act will change this policy.

Laudatory Words Are Valid

However, general laudatory words like "Excelsior," "Eureka," "Majestic," are not considered descriptive and may be registered.

There are hundreds of "Excelsior" or "Gold Medal" and similar marks in use. As a result, the courts will not protect the owner against an unfair competitor as fully as where a unique and arbitrarily coined name (such as "Vaseline" or "Kodak") is involved.

Use of Grade-Marks

Grade names, used only to distinguish one particular class or quality from other goods of the same manufacturer, may not be registered. But registration is available where a grade-mark simultaneously and primarily denotes the origin or ownership. Then it is a valid trade-mark.

If you make many different articles, consider selecting one trade-mark for all of them, and, in addition, using certain grade designations for each item. If this is impractical, each article should be so marked as to give its name an independent trade-mark significance which goes beyond merely designating one of many available grades or styles.

Numerals and Letters Registrable

Numbers, initials, letters of the alphabet may be registered when they distinguish particular goods. This is true under both the present and new laws, although neither expressly covers the point. Some foreign countries prohibit these registrations but they have always been accepted here. As result, "Z.B.T." (talcum powder), "RCA" (radios), "4711" (perfume), and "57" (groceries) are all registrable.

Misdescriptive not Allowed

No trade-mark which is "misdescriptive" can be registered. While the present act does not expressly reject such terms, both the courts and the Patent Office have uniformly denied them protection. Hence, in the case of "Holed Tite," misspelling of "hold" and "tight" was held misdescriptive when used on egg flats or similar articles.

Note that rules against descriptive marks do not affect the Lanham Act's protection of descriptive terms which have acquired a distinctive, exclusive trade-mark meaning. This is a big change from the present law. Before July, 1947, such terms could not be registered unless used exclusively as trade-marks for at least 10 years before 1905. Under the Lanham Act, these terms can be registered upon proof of distinctiveness.

Using People's Names

Under the new law, people's names may be registered as trade-marks much more easily than has been the case in the past.

Only names which are *primarily* surnames will be excluded after July 1947.

This change scraps the double test now in use. Under present law, no surname gets approval unless: (a) it was exclusively used as a trade-mark for 10 years before 1905; or (b) it fulfills the test of "distinctive display" (the name is printed so distinctively that it's no longer thought of as a surname but is identified only with the product).

Surnames to Have the Benefit of Doubt

In the future, benefit of the doubt goes to the applicant. Rejections will not occur except where there is a currently recognized surname. An arbitrarily chosen name will no longer be ineligible simply because it happens to appear in some phone book. Likewise, names of historical or fictitious characters and names with a predominant meaning other than family name will continue to be registrable. But if the term is chiefly known as a common surname, it will still be rejected.

The new act omits any reference to common surnames "distinctively displayed." It is not certain, therefore, whether surnames such as "Jones" can be registered in situations where they would have qualified under the "distinctive display" test. But it's a good bet that such usage will not be considered "primarily" a surname use, and the name may, therefore, be registrable as thus displayed.

Don't select any name which also has an important geographical meaning. "Washington," "Madison," or "Cleveland" would probably be called primarily geographical and disapproved even where the name clause did not forbid their use. But in a case like "Bismarck," the primary significance may be deemed historical rather than geographical.

Individual Names Require Consent

Under both the present law and the Lanham Act, no portrait or signature of living individuals can be registered without their written consent. This prohibition probably extends to nicknames or assumed names. In the case of a deceased president of the U. S., his widow's consent is necessary. Names like "Babe Ruth," "Ephraim Tutt," and "Franklin Roosevelt" all require written consent.

Use of Corporate Names

The present law prohibits the registration of any mark which consists merely of the "name of . . . a corporation." There is no similar provision in the Lanham Act. But this does not mean that the field will be wide open for anyone to register a word already being used as the name of a corporation. Section 2d of the new law forbids the registration of any mark which "so resembles . . a trade name previously used in the U.S. . . . and not abandoned, as to be likely . . to cause confusion." Thus, a corporate name on file with the Patent Office (or otherwise known to the Office) will probably be considered a "trade name"—so that no one else could register a name that might be confusingly similar.

It is obvious, however, that no corporation will be able to prevent registration of a name simply by making that word its own corporate title. Under the old law, if a corporation's name were "Simplex, Inc.," the corporation could prevent registration of the word "Simplex" for any other merchandise, no matter how unrelated.

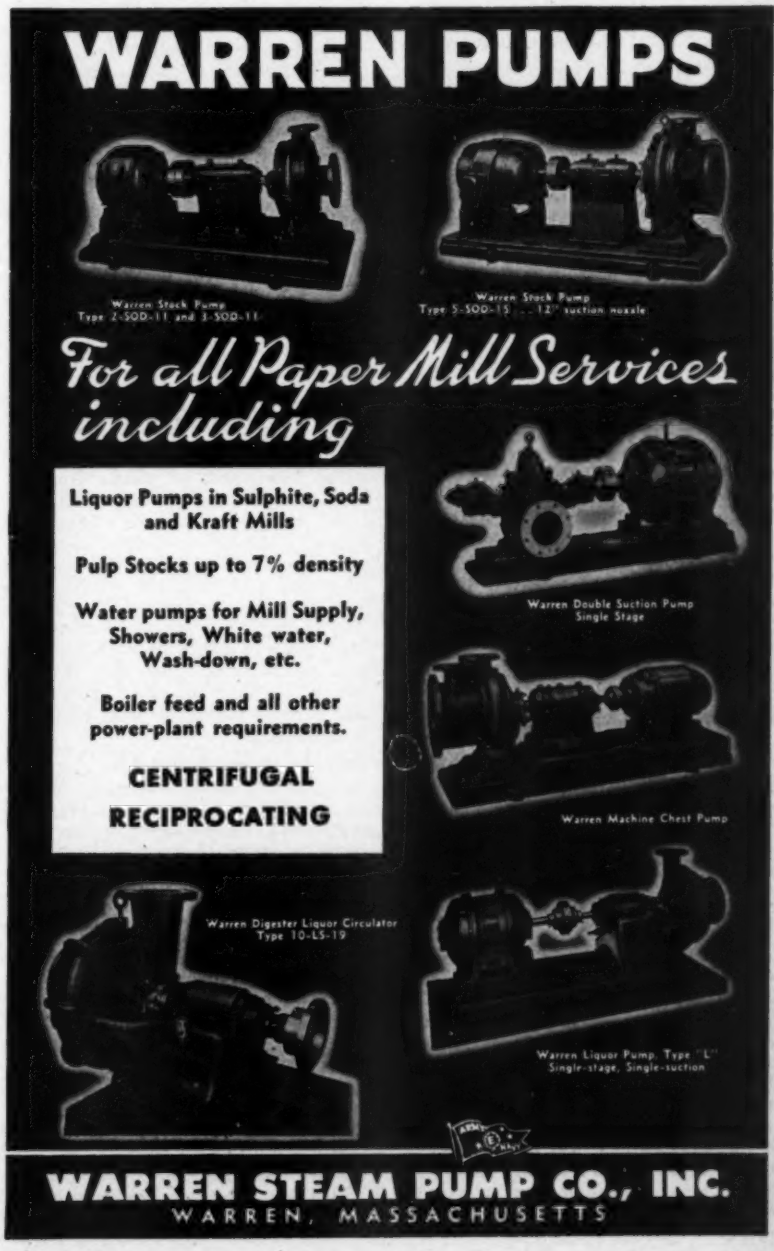
Where an applicant seeks to register a mark which is only a part of a corporate name, the ordinary rules of trade-mark law will continue to govern, under the Lanham Act as well as the present law. This type of situation would arise, for instance, where an applicant wants to register the word "Simplex" for cutlery, despite the fact that the name "Simplex Heating Corporation" is on file with the Patent Office. The applicant would probably be allowed to register the word "Simplex," if only on the ground that cutlery and heating appliances are not in the same general class.

Color and Utilitarian Features

Color

Neither the present nor the new law deals specifically with the problem of registering color as a trade-mark. It is, however, well recognized that a color device may be protected and registered even under the Act of 1905 where a party uses a distinctive color symbol, such as a red star or blue cross or a similar device.

Where the coloring of an article does not serve any utilitarian function but is only used as a means of identification for the consuming public, it may be recognized as a trade-mark at least as against use of the identical color device on the same or similar merchandise. Thus, the Supreme Court many years ago afforded trade-mark protection to a red color stripe


WARREN PUMPS
Warren Stock Pump
Type 2-SOD-11 and 3-SOD-11
Warren Stock Pump
Type 5-SOD-15 . . . 12" suction nozzle
For all Paper Mill Services including
Liquor Pumps in Sulphite, Soda and Kraft Mills
Pulp Stocks up to 7% density
Water pumps for Mill Supply, Showers, White water, Wash-down, etc.
Boiler feed and all other power-plant requirements.
CENTRIFUGAL
RECIPROCATING
Warren Double Suction Pump
Single Stage
Warren Machine Chest Pump
Warren Digester Liquor Circulator
Type 10-LS-19
Warren Liquor Pump, Type "L"
Single-stage, Single-suction
WARREN STEAM PUMP CO., INC.
WARREN, MASSACHUSETTS

which had been used as a means of identification as a trade mark for wire rope. But the Patent Office tribunals have been extremely reluctant to permit registration of color alone even if limited to one particular color and even if no apparent utilitarian purpose is served.

Utility Features

There is nothing in the Lanham Act to indicate that mere utility features of design can ever acquire trade-mark distinctiveness. This continues a rule which exists under the present law.

A mark consisting of a herringbone design on fish bait was recently rejected on the ground that the design gave the bait a "fishy" appearance and was, therefore, utilitarian.

New Rules on "Secondary Meaning"

The Lanham Act, in one of its most important innovations, now provides for registration on the Principal Register of all marks "which have become distinctive of the applicant's goods in commerce." In other words, even a term which is originally ineligible as merely descriptive, or primarily geographical, or primarily a surname, may now be registered if its primary meaning has become so insignificant that, for all practical purposes, the trade-mark implication of the word has become its predominant characteristic.

It should be noted that under the new law certain unregistrable marks can never acquire distinctiveness. This is particularly true of immoral and scandalous marks, of the flag or coats or arms, and of the Red Cross symbol. In addition, the prohibitions against registration of the name or portrait of a living individual without his consent, or of that of a deceased President of the United States without the consent of his widow, are also absolute prohibitions. Therefore, failure to obtain such consent cannot be cured even by many years of use and resulting trade-mark significance.

But apart from these relatively unimportant absolute prohibitions, the new law will make it possible to acquire the benefits of an incontestable registered trade-mark for thousands of marks which at present cannot be registered under the Act of 1905.

New Protection for Service Marks

Under the Lanham Act, service marks will be registrable for the first time. The new law thus gives great protection to a category of names and designations whose trade importance was not recognized under the present law. Once registered, service names will also be entitled to the same amount of protection as are trade-marks. A separate register for these marks will be established.

The Lanham Act's definition of "service mark" is very broad. Section 45 says it is "a mark used in the sale or advertising of services to identify the services of one person and distinguish them from the services of others and includes without limitation the marks, names, symbols, titles, designations, slogans, character names, and distinctive features or radio or other advertising used in commerce."

Under the new law, service marks include certain advertising and radio programs which otherwise could not be registered. Program titles such as "Take It or Leave It" or "The Lone Ranger" will be registrable by those who originally own these programs. The Commissioner of Patents will have to determine what names or designations may be registered—as well as who can be protected—under the new broad definition of service marks.

Until the Patent Office issues regulations after July 1947, regarding registrability of slogans, manufacturers and business men generally should use the services of some private organization which files and publishes slogans under a filing date so as to establish a priority record. *Printer's Ink* and the United States Trade-Mark Association are two such organizations.

In addition, companies should be prepared to show that they have continuously used such advertising slogans from the date which they intend to establish as the priority basis for the registration.

Certification Marks Registrable

A "certification mark," according to the definition of the Lanham Act, is a mark "used upon or in connection with the products or services of one or more persons other than the owner of the mark to certify regional or other origin, material, mode of manufacture, quality, accuracy or other characteristics of such goods or services or that the work or labor on the goods or services was performed by members of a union or other organization."

Such marks may be registered on a separate register by the person who exercises legitimate control over the use of the mark. That person may register the mark even though he does not himself possess an industrial or commercial establishment.

The Department of Justice expressed fear at the last minute that certification marks might be abused for monopolistic purposes. Although this apprehension apparently concerned the possible abuse of association and collective marks rather than of certification marks, a last-minute amendment to the Lanham Act will, in effect, make it practically impossible or at least inadvisable to register such names as "Buick" or "Ford" or "Esso" as certification marks in addition to registering them as trade-marks.

Collective Marks Registrable

Collective marks are defined by the new act as marks "used by the members of a co-operative, an association or other collective group or organization"—including union labels. Such marks may now be registered as collective marks wherever they are used to indicate that members of the co-operative, association or union have been connected with the manufacture of the merchandise on which the marks are used.

Only recently, the Commissioner of Patents refused to register the name "Textile Workers Union of America" appearing on the representation of a scroll above which appeared the words "Union Made." The words "Union Made" were disclaimed and registration sought for hosiery.

Likewise, registration of the letters "R.C.I.P.A.," standing for "Retail Clerks International Protective Association" was rejected on the ground that the mark indicated only that the merchandise was serviced by the association but was not a trade-mark in and of itself. Under the Lanham Act this association mark will become registrable as a collective mark.

Rules on Conflicting Trade-Marks

The present law sets up some rather complicated tests to determine when a mark was to be rejected as "conflicting." The Lanham Act provides simply that a trade-mark previously used or registered by one party shall not be registered for another applicant if it is likely "to cause confusion or mistake or to deceive purchasers" when applied to the applicant's merchandise. (Section 2b.)

Similarly, Section 32 of the Lanham Act provides an infringement remedy in any case where the alleged infringing mark is likely to cause confusion, regardless of whether or not it is used on merchandise of "substantially the same descriptive properties."

Under the present law, a mark is rejected if (a) it is either identical or confusingly similar to another mark, and (b) it is used on identical or confusingly similar goods. Note that registration will be denied only if there is confusion with regard to both these matters.

New Benefits in Lanham Act

Several important innovations will flow from the Lanham Act's view of conflicting trade-marks. Among the major benefits which can be foreseen are the following:

1. The new law makes it very clear that the Patent Office classification will serve "only for convenience of Patent Office administration." It will not "limit" or extend the applicant's rights. As a result, it will have even less bearing than at present in connection with the determination of confusing similarity.

2. The "confusion in trade" clause will now be applicable whether or not the goods are of the same descriptive properties. This will enormously strengthen the position of the first user or first registrant in cases where his mark has become nationally known. The Patent Office will be in a position to apply broad principles of unfair trading in determining whether the newcomer's trade-mark should be registered. Where it seems that the newcomer is trying to capitalize on the first user's reputation or good will, registration may be refused on that ground alone if the public might conceivably associate the newcomer's product with the first user's business.

3. The new law benefits not only the first registrant on the Principal Register—but also benefits a prior user who has widely used a trade-mark or trade name without obtaining a federal registration. Such a first user, whether an individual or corporation, could oppose the registration of the mark under Section 13 of the new law or bring cancellation proceedings under Section 14 (if the mark has already been registered). He would have to show (a) that the mark is still in use by him and not abandoned, and (b) that he will be damaged by the new registration because public confusion is likely to result. The opposition will be sustained or the

registration canceled if likelihood of confusion can be shown, regardless of whether or not the goods have the "same descriptive properties."

4. The test of "same descriptive properties" has also been eliminated in connection with interference proceedings. Under the new Section 16, the Commissioner of Patents may declare an interference in any case where an application is made for a previously registered mark if, in his judgment, the second registration would cause confusion. The same test applies if an interference is declared between two pending applications for the same or similar mark. Under the present law, no interference will be declared unless the conflicting marks are, in the Commissioner's judgment, used on merchandise of the "same descriptive properties."

New Condensation Products of Formaldehyde with Amides and Amines

Report[1] by DR. H. SCHEUERMANN, I. G. Farbenindustrie A.-G., Translated by MRS. I. G. CALLOMON and G. M. KLINE, National Bureau of Standards

▶▶▶ THE SCARCITY of natural glue, phenolic resins and rosin, as well as the increasing utilization of wood wastes has resulted in a very urgent demand for suitable binding agents for use in the production of building boards from mechanical wood pulp or finely ground wood wastes and for the sizing of paper. For some purposes, the well-known urea-formaldehyde resins, especially Kaurit glue, can be used advantageously. But in other cases these products are unsuitable because the manufacturing process requires precipitable resin solutions or emulsions. Urea resins with these properties have been unknown up to this time. Although some precipitable urea resin emulsions, especially in conjunction with methyl ether, have ben produced, their binding properties are not satisfactory.

It is obvious that precipitable urea resins might result if the urea resin itself could be given acid or alkaline characteristics. Alkaline urea resins as such are known, e.g., the product obtained according to Hassler's patent application by condensation of ammonium salts, formaldehyde and urea. However, these products are not precipitable. These experiments were extended and applied to other aldehydes. It was found that one could obtain resins which would be precipitated readily by alkalies or especially alkali salts of resin acids if urea-formaldehyde resins are treated with acids or acid salts. Considerable amounts of acid ions are necessary, approximately 0.3 to 0.6 mol per nitrogen atom. Products with better precipitability are obtained through condensation of ammonium salts, formaldehyde, other aldehydes and urea. However, the gluing or sizing action of these basic resins is very poor after precipitation; satisfactory results can be obtained only by joint precipitation with alkali salts of phenolic resins or rosin.

Another means of obtaining precipitable urea resins is to incorporate into them compounds which contain both an acid group capable of salt formation and a radical, particularly the amino group, condensable with formaldehyde or methylol groups. Especially suitable are amino and urea carboxylic acids as well as phenolic carboxylic acids; the presently available aminosulphonic acids are unsuitable. The condensable carboxylic acids in amounts from 5 to 50 per cent based on the weight of urea used for condensation, give products varying from highly viscous, gel-like glues to liquids of low viscosity, miscible with water in all proportions and easily precipitable with aluminum sulphate or acids. The precipitation products vary from resinous to mucilaginous to casein-like materials.

These products are not suitable alone for paper sizing, but they can be used together with rosin to conserve the supply of rosin. As glue for hot-pressed hard boards made of groundwood, addition of 4-8 per cent of these resins, based on the groundwood, results in boards which are superior in breaking strength to those bonded with phenolic resins, but do not comply with the resquirements for water resistance. This disadvantage can be partly removed by addition of sodium soaps of fatty acids to the resin solutions and simultaneously precipitating the resin and fatty acids on the wood fiber.

A surprising observation during these experiments was that even when the condensation is carried to highly viscous, barely water-soluble products, not more than 65 per cent of the resin in the aqueous solution can be precipitated either with aluminum sulphate or with acids.

One great disadvantage of the aqueous condensation solution is its limited storage life. It is not possible to stablize the condensation products for long storage, especially the highly condensed ones.

When aminocarboxylic acids or better urea carboxylic acids are added during the Plastopal condensation, water-soluble to emulsifiable Plastopals are obtained, depending on the alcohols which are simultaneously condensed with them in the presence of alkalies. Melamine and melamine derivatives give the same results as urea.

In continuation of this work, sulphites, disulphites or their aldehyde derivatives were investigated as solubilizing components. The resulting products have remarkably good properties. They are well suited as sizing or finishing agents or as liquid glues and they have been used for these purposes. They can be further improved by additions of other condensable substances, such as amines, phenols, etc. In order to attain the desired water solubility with a high degree of condensation, about 20 per cent of a sulphite, particularly an alkaline sulphite, based on the urea or the melamine, is necessary.

It is surprising that even with a mol ratio of 1 urea to 1 formaldehyde or 1 melamine to 1-2 formaldehyde products are obtained which are soluble in all proportions in water. According to observations thus far, the products are very stable. Thus for the first time, it has become possible to prepare a urea resin product very similar to natural glue. A 40-50 per cent solution gives a solid gelatin-like product which melts readily at 60-70 C. and becomes solid again within 15-30 minutes upon cooling. Like a hide glue, it swells slightly in cold water but is only difficultly soluble. According to tests, it is suitable as an adhesive for gummed tape and labels and is being used for these purposes in a somewhat more liquid form in Leverkusen in large quantities. According to our tests, it is superior to many products which are temporarily being used for this purpose. It is practically odorless and tasteless and does not contain free formaldehyde. It is also suitable as an extender for soaps, especially those made from fatty acids obtained by oxidation of paraffin. It is possible to add to the soap up to 40 per cent of the resin without impairing the formation of lather. The irritation which usually occurs with these soaps is completely absent.

The Paper Laboratory in Ludwigshafen has discovered that products of this type are excellent for extending the supply of rosin soaps or the Hoechst sizing materials. Resinous solutions of these substances are perfectly miscible and, jointly precipitated with acids or aluminum sulphate, give a very good and economical sizing.

Recently, a urea derivative made with urea and glyoxal,—namely, glyoxaldiureide or acetylenediurea—has aroused considerable interest. It gives a very stable tetramethylol compound which is easily water soluble, and produces by acid condensation in aqueous solution resins which are slightly water resistant. The value of the tetramethylol compound is in the fact that the methylol groups easily form ethers with alcohols. Thus in acid condensation with monoalcohols soft to hard resins are produced which according to the tests of the Color Division in Ludwigshafen are compatible with cellulose esters and are similar to Uresin B. The compound seems to react easily with the hydroxyl groups of cellulose itself, so that the product may offer some interest for the improvement of cellulose.

The tetramethylol compound has been used successfully under the designation

[1]This report was presented at the 26th Kuko (Plastics Committee) meeting in Frankfort on February 14, 1943. It is PB 11428 of the Office of Technical Services, Department of Commerce.

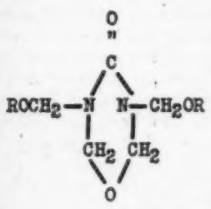


Figure 1

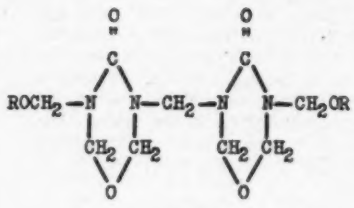


Figure 2

"Lu-Ho 3/140" as a textile intermediate to improve hand, to prevent shrinkage and to impart crease-resistance. A condensation product of tetramethylol-acetylene-diurea and octadecyl or fatty alcohols from paraffin oxidation, which is produced in the presence of methylpyrrolidone or dimethylformamide, is easily dispersible in water. A patent application (Lu 3/158) is pending for its use as a hydrophobic agent based on experiments by Dr. Lintner, of the Ammonia Laboratory, and Dr. Leupin, of the Color Division.

In repeating the work of Kadowsky[3] on intermediate products in urea-formaldehyde resin formation, several practical methods for making "Uron" ethers were found. These ethers have structures as shown in Figures 1 and 2.

They are thin to glycerol-like liquids which cannot be hardened under normal conditions but can very easily be converted to higher ethers with higher boiling alcohols. If alcohols with at least two hydroxyl groups are used for this purpose, resins varying from hardenable to non-hardenable types can be produced Products of this kind are now being investigated.

[3] *Bull. Chemical Soc. Japan*, 11, 248-261 (1936).

Convention Papers . . . Abridged

Development of Jacketed-Type Steel Dryer Rolls*

WM. H. FUNK, Development Engineer Lukens Steel Company and Subsidiaries, By-Products Steel Corp. and Lukenweld, Inc.

In the early 1930's, a welded steel, single-shell dryer roll was installed as a replacement in a bank of cast iron dryer rolls. There had been a failure and the use of this steel roll was considered mainly because it could be obtained very quickly. This may not have been the first instance of the use of a welded steel dryer roll. However, it did provoke considerable thought and discussion because of the increased operating efficiency and longer bearing life through improved journal design, which resulted. These advantages have continued over the more than 12 years of nearly continuous service rendered by the dryer roll which is operating in a mill making paperboard.

This early single-shell dryer roll was a duplication of the over-all design of a typical cast-iron roll, except that the inner shell and the heads were made an integral piece by welding.

Figure 1 shows this roll as it appears in the drying machine. The size of the roll is 3 ft. 6 in. O.D. by 10 ft. 6 in. face. The journals are designed with an insulating air chamber between the steam passage and the bearing to reduce the temperature on the bearing.

(*) Abridged from paper presented at the annual meeting of the American Society of Mechanical Engineers, held in New York City, December 2-6, 1946.

There were few who thought that this dryer roll would be much different in performance than the conventional type generally in use. However, some engineers saw, through the use of fabricated steel design, the means of improving on several features inherent in conventional single-shell dryer roll design. A large diameter single-shell roll requires very thick head sections which contribute substantially to the weight of the roll. If the steam were confined to an annular space between two shells, this heavy end design could be eliminated. The higher strength of steel plate would allow the use of lighter gauges for the shells so that two shells plus internal stiffeners would weigh little, if any, more than a single cast-iron shell. The weight reduction would be very beneficial in service. Figure 2 shows jacketed dryer rolls of this design before machining. They are 6 ft. 0 in. O.D. by 5 ft. 0 in. face. The journals were machined for roller bearings and a drive gear, and the face was machined to a polished finish. Figure 3 shows a schematic drawing of a section of this roll. Note the absence of any heavy sections in these dryer rolls.

In this double shell design, the flat head plates, which close off the ends of the steam chamber and support the shells by spokes from the journals, also provide the means of passing steam into the annular shell space. Half-pipe sections, welded to the spokes, and holes drilled in the inner shell and journals, form a steam passage through one journal, across the face of the roll and out the other journal. Some of the earliest jacketed-type steel dryer rolls designed and built in this manner were used by a publishing company to dry printed ink.

The next consideration in furthering the design of the jacketed-type dryer roll was better condensate removal. Jacketed-type steel dryer rolls already built were operating very satisfactorily and more were being fabricated. However, it was acknowledged that a more positive method of removing condensate should be incorporated in future designs. As a result, a Yankee dryer roll was built with two provisions for condensate removal incorporated in the design. Figure 4 shows this dryer roll which is 8 ft. 0 in. O.D. by 6 ft. 10 in. face. Every section on this dryer roll is now serving a double function since each piece is a strength member and is also part of a steam passage. The steam inlets have become pipe spokes and the end plates have become rings acting as closure plates only. The condensate provision used at slow speeds is a scoop arrangement and was designed to pick up the water lying at the low point of the dryer and remove it. At higher speeds when the condensate rotates with the roll, this scoop would not remove the condensate. A pipe, therefore, is inserted through the inner shell so that the open end of the pipe is very close to the inner surface of the outer shell. This pipe draws off the condensate leaving a water film, the depth of which is equal to the clearance between the pipe and the shell. Valves in these condensate lines make it possible to use the dryer roll at any speed and still evacuate the condensate. The passage of steam in this dryer roll is through one journal, into the pipe spokes at both ends of the roll, and into the jacket space, from the center of which, by one system or the other, the steam and condensates are removed through the opposite journal. The pipe spoke design is an improvement over the one used in the earlier dryer rolls because in the current design there are no unheated sections to restrict roll expansion. Stiffeners on the inner shell have been eliminated. These dryer rolls may be closed at the ends to keep heat losses from the inner shell at a minimum.

The operation of this first Yankee dryer roll refinitely indicated that the jacketed-type design was more efficient than a single-shell design. The roll was first operated at the speed and steam pressure peviously used with the cast roll it replaced. Flashing and burning of the tissue paper being made, resulted. To produce the paper satisfactorily the steam pressure was reduced to less than 5 psi, and the speed of the machine was increased. Later the pressure was raised slightly and the speed increased still further. This jacketed-type steel dryer roll, currently produces more paper than was possible with the cast-iron roll, although it uses exhaust steam instead of live steam directly from a boiler. Tissue paper has been creped from this roll ever since it was installed and the doctoring action has not been detrimental in any way. This doctoring is a scraping action on the face of the roll, while it is in operation, for

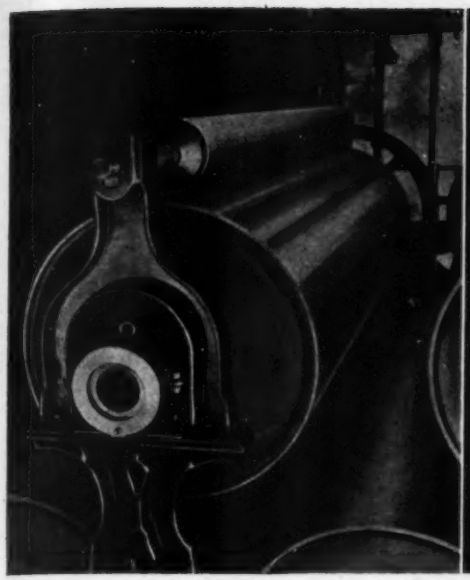


Figure 1

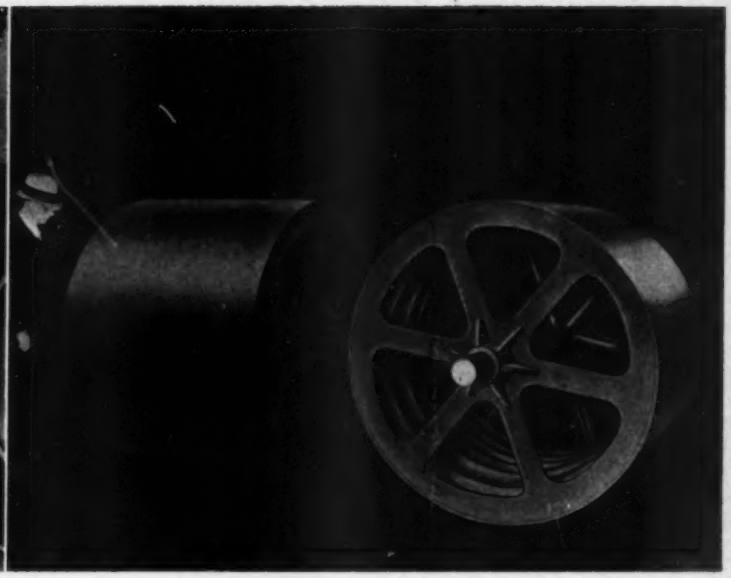


Figure 2

the purpose of creping, flaking, cleaning or polishing.

Rolls can be made for higher pressures than were ever practical before. They can be made so that they will give constant and uniform temperatures over the face. A jacketed-type steel roll also can be designed with solid stainless shell or with a clad steel shell to resist corrosion or prevent contamination of the product. The jacketed-type steel roll can be designed for use when chromium, nickel or other plating is desired on the face.

The mechanical advantages incorporated in the design vary to a degree with the size of the roll and the design selected. A jacketed-type roll 3 ft. 6 in. O.D. and under, will not be lighter than a typical single shell roll but larger diameter rolls do show an appreciable weight saving which is reflected immediately in the design of the supporting frames and in the drive unit for the roll or rolls. The bearings for the roll can be smaller because of this weight saving and also because the relative strength of steel versus cast-iron permits designing smaller journal diameters. There is added mechanical safety in the use of welded rolls in case of failures under pressure. If, for any reason, too much pressure is applied to the roll, the steel plate will distort to a noticeable extent before fracture occurs. This reduces to a minimum the chance that a roll failure may cause property damage or personal injury due to a sudden explosion. With a welded roll there will be no bolted or riveted joints that may from time to time become loose and leak. Figure 9 shows a dryer roll 10 ft. 0 in. O.D. by 8 ft. 0 in. face which was designed for 100 psi steam pressure. The roll was machined under a water pressure of 100 psi and was being prepared for a final hydrostatic test at 200 psi

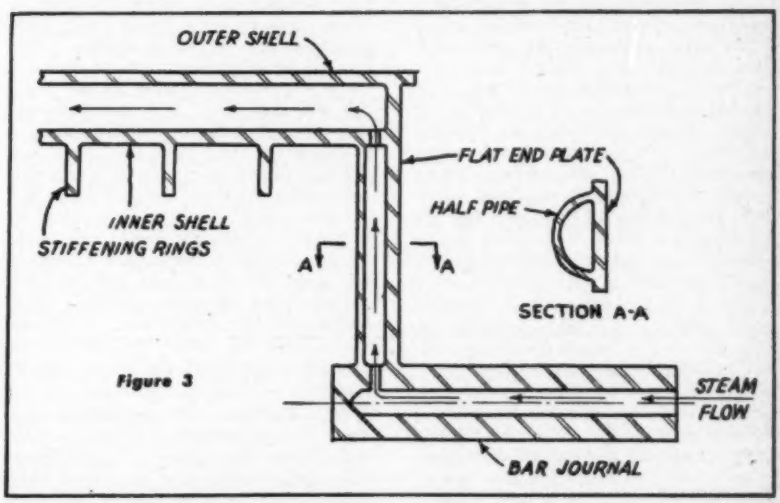


Figure 3

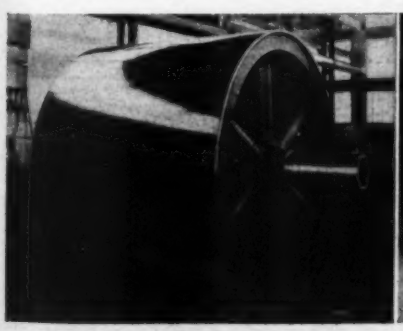


Figure 4

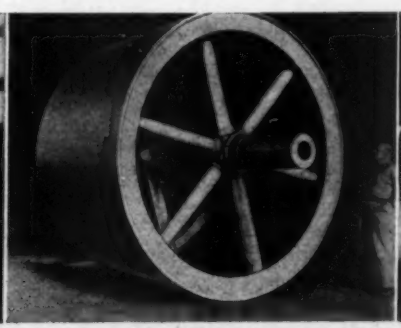


Figure 9

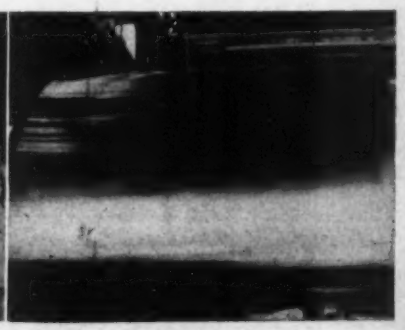


Figure 10

$$Q = U \times A \times \Delta T$$

Where Q = Heat transferred in BTU/hr
U = Over-all coefficient of conductance in B.T.U./hr/sq. ft./°F
A = Area in square feet
And ΔT = Temperature difference in °F between the steam and the sheets to be dried.

The value for U can be derived from the following formula:

$$U = \frac{1}{\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3} + \frac{1}{h_4}}$$

Where h_1 = Conductance of condensing steam
h_2 = Conductance of film on inside of shell (dirt, scale, etc.)
h_3 = Conductance of metal shell
h_4 = Conductance of film on outside of shell.

Figure 11

when the pressure was accidentally raised much higher than the 200 psi specified. Instead of exploding, the weakest section of the roll, which was the outer shell plate, distorted and relieved the excess pressure. The permanent distortion of the shell plate was the only indication of failure. Figure 10 shows this distorted shell plate. The maximum permanent set was about 1¼ in. Still higher pressure probably would have blown a hole in the shell, but there would have been few flying fragments. The outer shell of this dryer was replaced and remachined. The dryer roll is now in operation.

The welded roll, designed correctly for its intended use, has operational advantages over a conventional-type roll. The jacketed design, which is adaptable to most uses, guides the steam in a restricted area across the inner surface of the face of the roll. The net cross-sectional area inside the roll which contains steam is therefore much less than that of a single shell roll. If it were assumed that a jacketed type dryer roll in operation has the same surface speed, operating pressure, rate of drying of paper and rate of condensation in the roll as does a single shell roll, one thing becomes apparent: the steam velocity in the jacketed roll must be greater by the same ratio as the net cross-sectional area is smaller. In considering what this greater steam velocity does in the jacketed-type roll it is found that, first, it reduces the film on the inner surface of the shell plate. This film offers considerable resistance to heat transfer through the shell. Second, it minimizes the possibility of dead steam in the roll. Steam is guided into this jacket through a series of inlets spaced around the roll in a manner designed to keep all the steam in the roll in controlled motion. Third, the feature not only of channeling all the steam but also moving it at a higher velocity, is better insurance that air in the entering steam will be flushed out immediately with the exhaust steam and condensate. Dalton's Law of Partial Pressures states that the total pressure exerted by a mixture of gases is equal to the sum of the pressure which each gas would exert if it alone would occupy the whole volume. This law can be interpreted to mean that any air in the steam chamber of the dryer roll will cause the actual steam pressure to be lower than that indicated by a gauge in the steam line. As a result, the temperature in the dryer roll will not correspond with the steam temperature at that pressure. Just a small percentage of air in the roll reduces the drying rate of the machine. Fourth, the greater velocity of the steam and the guiding feature of the narrow steam passage maintain a more uniform surface temperature across the face of the roll. Also, the rate of heat transfer improves as the steam velocity increases.

By examining the assumption, with these features in mind, it is apparent that the rate of drying must increase because the conditions tending to retard heat transfer have been improved. Increased drying ability must be offset by increasing the operating speed if the residual moisture content of the sheet being dried is to be held constant.

Unfortunately, the nature of this increased operating speed, which is a measure of the productive efficiency of the drying machine, cannot be calculated to any degree of accuracy. There are too many indeterminate variables in a dryer roll section of a machine in addition to the roll itself that have a direct bearing on the drying rate.

Figure 11 shows the basic formula for heat transfer.

Figure 12 shows the various components of the over-all conductance. The jacketed-type steel roll is not thought to affect appreciably the values of h_3 and h_4. It is known, however, that better heat transfer is obtainable from jacketed dryers without altering the drying area A or the temperature differential ΔT, in Figure 11. It is assumed then, that h_1 and h_2, the conductance of the condensing steam and the inner film, are the factors which cause this better heat transfer. How to evaluate this assumption is not definitely known. There is very much more development required before the best heat transfer rates will be obtained for the jacketed design. The only reliable methods known at this time, to measure the increased efficiency of a drying machine, which may be due to the use of a jacketed-type steel dryer roll, are a practical test or by laboratory research. At this time, it should be pointed out, that regardless of the type and weight of the sheet being dried, a function of the dryer roll is always to promote the evaporation of moisture from the sheet. Most of the heat absorbed during evaporation is supplied by the latent heat released when steam in the roll is condensed. Basically, then, a better heat exchanger will be a better dryer, provided the additional heat is released through the shell and is not lost through radiation from the ends of the roll. To reiterate, increased drying ability must be offset by increasing the operating speed if the residual moisture content of the sheet is to be held constant.

A practical test performed in the following manner confirms the theoretical assumptions which have been mentioned. Ten jacketed-type steel dryer rolls, 3 ft. 0 in. O.D., as shown in Figure 13, were installed in a paper machine in a felt mill to replace 10 cast dryers in a bank of 54 single-shell, cast-iron rolls. This felt mill produces the felt base for roofing materials and for floor coverings such as linoleum. The operating steam pressure for the cast-iron rolls was 50 psi while the pressure of the jacketed rolls was increased to 150 psi. No other changes in the machine, or in its operation, were made. The production rate was increased approximately 8 per cent to 10 per cent over the average rate before the replacement. Where corresponding increases in pressure and temperature are possible, this increased efficiency presents an interesting

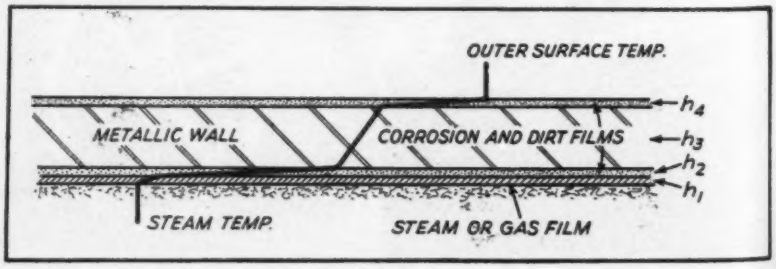


Figure 12

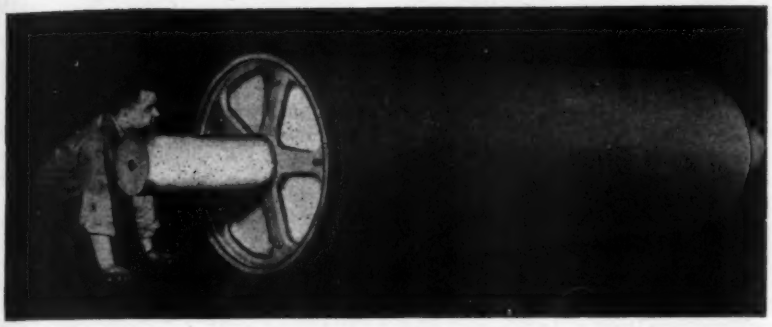


Figure 13

comparison. Keeping in mind that this installation has only 10 out of 54 rolls changed, it can be figured that at 150 psi pressure the jacketed dryer rolls show an increase in efficiency of from 40 per cent to 50 per cent. The efficiency increase, due to the increased pressure based on data collected from several sources, is estimated to be about 30 per cent to 33 per cent. The remaining increase in efficiency of about 15 per cent must be attributed to the jacketed steel design of the dryer rolls.

In order to determine the relative efficiency of the jacketed-type steel dryer roll at the original operating pressure of 50 psi, the pressure on the steel dryer rolls was reduced to 50 psi and observations were made with the machine running under conditions similar to those existing before the steel dryer rolls were installed. Results indicated that the residual moisture content of the sheet was 28 per cent less when the steel dryer rolls were used, and that the average operating speed was increased 4.6 per cent. Again, noting that only 10 of the 54 rolls were replaced with steel dryer rolls, it can be seen that each jacketed-type steel dryer roll demonstrated an increase in efficiency of nearly 25 per cent.

A conservative appraisal of this practical test indicates that 18 per cent is a safe figure for increased efficiency of small diameter dryer rolls. This figure is much more conservative for large diameter dryer rolls and for Yankee dryer rolls.

The jacketed-type steel dryer roll effects savings in initial costs in several ways. For a desired production rate, this type of roll in a new machine reduces the amount of floor space needed by reducing the number of dryers required. This may mean actual savings in building costs. Medium to large size rolls are, by comparison, more economical to purchase. Accompanying frame and bearing costs are lower because of reduced weight.

Operational costs also may be reduced by virtue of reduction in weight and design. Lighter equipment requires less horsepower for driving. The jacketed-type steel dryer roll requires no shut downs for tightening bolts to stop steam leakage. The jacketed design reduces the time required to bring the roll to operating temperature. The usual starting delays are cut to a minimum whether the roll is operated with steam or with water because there is no large volume of cold water in the bottom of the roll to be removed or to be brought to temperature. For an equal number of dryers, the operational costs per ton of finished product are reduced when the operating efficiency is increased.

Data are available on the fabrication of nearly 200 steel dryer rolls now operating in many different industries. All these rolls have satisfactory performance records and most of them have been contributing factors in increasing production on the drying machines in which they are operating. Only one of these rolls has given a purchaser reason to criticize its physical stability. This one roll, a Yankee dryer, 10 ft. 0 in. O.D. developed an out-of-round condition within a year after it was put into operation. This out-of-roundness was confined to a flat spot over an area near the seam weld of the outer shell plate. The reason for this occurrence was traced to incorrect processing before the roll was machined. The method of processing was changed, and rolls fabricated since that time have maintained their size and shape satisfactorily. The out-of-round condition on 10 ft. 0 in. O.D. roll was not serious enough to prevent making tissue paper and napkin paper at speeds of over 1000 fpm on it for four years before it was remachined to a true diameter. That roll is still operating at 1000 fpm and should give no further trouble so far as dimensional stability is concerned.

Abridgments in this section are from papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 25-28, 1946.

Laminating Adhesives and Their Applications

ARTHUR BIDDLE
Director of Development
Reynolds Metal Company

It may be that too much attention has been given to educating the designing engineer to create a laminating machine and not enough attention to the man who runs it.

Unfortunately, the top chemical and engineering staff of a company who sets policies or specify adhesives or web materials never work on the machine. The foreman or operator is all too often blamed for mistakes of judgment made by his supervisors. If it is desired to improve laminated products, it might be well to give a few fundamentals to the operators and to the foremen.

The inherent properties of any adhesive mean very little if they are not considered in the light of the properties of the end use materials. It is, therefore, as necessary to study the sheets or webs as it is to know the adhering substance. Once the problems to be met are fully understood, it is merely a matter of either picking out or formulating the proper adhesive. Experience teaches that ignorance of the materials to be glued causes more trouble than the glue itself.

For instance, in the laminating of films such as cellulose or vinyl acetate, ethyl cellulose or cellophane to, say glassine, or parchment paper, the choice of a laminant is dependent to a large extent on the placticizer used in both the film and the paper. Some plasticizers will "sweat or bleed" to the surface and if they are incompatible with the adhesive used, poor adhesion will result. Since manufacturers of films often have difficulty in securing plasticizers, substitutes are used and the laminator runs into trouble. The answer to this is for him to constantly check each incoming shipment of film or web material and adapt his adhesives accordingly.

Generally speaking, all water absorbing or insoluble glues are known as hyprophillics. Some organics like certain phenol formaldehydes, are soluble in both water and alcohol and a few gums will tolerate substantial amounts of alcohol without coagulating. Although zein (the alcohol soluble portion of cornstarch) is soluble in pure alcohol, it makes a better solution when 92 to 98% alcohol-water solvent is used.

While it is well known that the water in aqueous glue mixtures swell paper fibers, it is well to determine the water content of the glue being used. By doing this an aqueous glue containing from 40 to 50% water may be used without causing undue stretch in the web before the drying operation or wrinkling and curling in the finished product. Where alkalinity and stiffness will permit, silicate of soda will answer this purpose. Where water resistance or high humidity is not a factor, one may turn to the more flexible and neutral dextrine or urea starch, with or without sodium silicate.

Polyvinyl Acetate and Buna Styren

If high solid content aqueous glues are needed for water resistance, then the polyvinyl acetate or Buna Styren dispersions should be used. However, both have at present, an undesirable monomer odor that may preclude their use in food packaging. It is hoped that the manufacturers will be able to remove the odor or else the trade must wait until the natural rub-

ber latex is again received from the eastern plantations.

In many cases the commonly used GRS type 3 synthetic latex can be used in place of the natural rubber latex. A knowledge of their differences may prevent glue room trouble. An alkaline or ammonical solution of casein, starch, or glue will mix with the GRS latex but a lime solution of casein (calcium casinate) will immediately coagulate the solids out of the dispersion. However, either an ammonical or a lime solution of casein or starch will mix with the natural rubber latex. On the other hand, nearly all casein solutions will be coagulated from the aqueous polymerized polyvinyl acetate solution. While acid starches and polyvinyl alcohol solutions are compatible with it, the organic solvent solution of polyvinyl acetate does not, of course, act the same.

The organic solvent solution may be dispersed in practically any colloid and be compatible, but the resultant mixture will retain the solvent and this is often objectionable. The solvent type of aqueous dispersion and the polyvinyl acetate that has been polymerized, when in its aqueous state makes good pressure sensitive adhesives when properly and sufficiently plasticized. By coating the web with the water dispersion, drying, and then pressure laminating, bonds may be obtained with dense papers, metal foils, or nonabsorbing films.

Vegetable Gums

Lowest in order of adhesive strength of the hydrophillic colloids are the real or vegetable gums, such as arabic, quince seed, and Irish moss. The gummy and dried extracts of the above appear to form true colloidal solutions. Gums such as karaya, tragacanth, agar-agar, pectin, or locust kernel do not really form solutions but merely swell in water. Of the last named, karaya swells the most. Saponin, an extract from the Saponiaria root, is somewhere between the true gums and the gums that only swell in water.

The gums most commonly used as emulsifiers are arabic, tragacanth, Saponin, and sometimes, karaya. Agar-agar and algin or sodium alginate although too expensive for most adhesives, are sometimes used in food packaging. Water soluble methyl cellulose and its sodium salt (sodium carboxymethyl-cellulose) are now being used extensively as adhesive additions for synthetic and natural latex in emulsions and dispersions. The water soluble celluloses possess low toxicity, are greaseproof and extremely fungi resistant. The methyl celluloses and its several derivatives are compatible with most other hydrophillic colloids.

With the exception of the natural dispersion of the aqueous polymerization product of polyvinyl acetate most dispersions are alkaline. When residual alkali is not desired, ammonium hydroxide is used. When used with metallic foils, it leaves no corrosive agent and permits resin dispersions to be irreversible after drying. A study of the emulsifying amines is necessary for one who wishes to understand dispersions and emulsions better.

Many water soluble or dispersed adhesives may be made more water resisting when dry by the addition of formaldehyde to the aqueous solution. It is advisable to add the formaldehyde to a dilute solution of aqua ammonia before mixing with the adhesive. Inasmuch as the formaldehyde and ammonia forms hexamethyltetramine *in situ*. A similar result may be obtained by the addition of the later chemical.

The value of gums lies not so much in their adhesive strength as in their dispersing properties, their ability to envelop in disperse phase nonwater soluble substances. There is another and more recent use for gums and water solutions of untreated corn starch. Occasionally weak adhesion is desired between two webs until further processing is accomplished, after which delamination is desired. If weak starch or gums are used, they can be washed off the delaminated webs if necessary.

Starch

Next in strength in the series of hydrophilic colloids are the glucoses, starches, and their degraded products, the dextrines, glucose, due to its property of crystallizing is seldom used alone, it is mixed with glycerine, sorbitol, or other humectants. Many glue formulas use it with bone or fish glue or with dextrine and starch. Its high initial tack or adhesion is often used to an advantage in formulations having ingredients whose maximum strength increases with time. The treatment of starch to heat under pressure with diluted hydrochloric and the subsequent neutralization with a mild alkali; clarifying and then concentrating the liquor comprises the essential steps in the making of glucose. Its property of surface adhesion and lack of penetration into porous materials increases its use when admixed with other adhesives.

Of the many starches, corn, cassiva, and potato, receding the order named, are the types extensively used. Cassiva starch, or cassiva meal, when formulated with lime, caustic soda and/or sodium carbonate is used in the wood veneer field and in making laminated fiber boards. The addition of natural rubber latex to cassiva glues increases their flexibility and water resistance as well as their adhesiveness to metals, glass, hardwoods, and plastics. The addition of several per cent of caustic soda to cassiva breaks it down sufficiently for most adhesive purposes.

Besides the treatment of starch-water slurry with chlorine, the addition of acids or acid salts also acts on the starch granules so that they are no longer capable of swelling when treated with hot water. Starches heated in water with diastase and/or amylase enzymes are greatly reduced in viscosity and improved in adhesion. The neutral nature of enzyme treated starches make them ideal for additive agents to either alkaline of acid substances or where a hydrogen ion other than seven or neutral is undesirable.

Dextrine, made chiefly by heating starch under exact control conditions is one of the main ingredients of gumming adhesives. It is also used to give tack to starch, silicate, and gum mixtures. When starch is heat treated in the presence of an acid, British gum is formed.

The addition of methylol urea to starch gives greater tack and some water resistance but the odor of generated formaldehyde may be objectionable. The use of thiourea gives somewhat similar results but produces a sulphurous odor that may not be desired. The use of ordinary urea does away with both of the aforementioned difficulties. The addition of insolubilizing agents like chromates, zinc chloride, formaldehyde, or para-formaldehyde all tend to increase water resistance but care should be taken to choose agents that are not injurious to the finished lamination.

Zein

Zein, or a commercial product known as Mazein, has many properties not well known among which might be mentioned the ability to heat seal. When used as a coating, it is in some respects superior to casein besides being heat sealing which casein is not. It also keeps oil inks on the surface and makes a much better printing job. When certain inexpensive papers are treated with zein, a sheet resembling glassine is obtained. Zein coatings on porous paper also prevent wax bleeding. Besides being soluble in alcohol, it is also soluble in 2-nitro-1-butanol.

Polyvinyl Alcohol

Although polyvinyl alcohol is somewhat expensive from a coat standpoint, its use as a greaseproofing ingredient and as an addition agent is valuable. It may be added to dextrines, casein, starches, soybean meals, and nearly all emulsions or dispersions, whether acid or alkaline to stabilize them. Its solubility in both water and alcohol increases its utility as a formulating substance in either water or alcohol mixtures. Its water resistance when in dry form is measured by the addition of dimethylol urea with an acid salt catalyst or by the use of formaldehyde, chromium compounds, dibasic acids, copper—ammonia compounds and zinc-ammonia compounds. The chief plasticizer for P.V.A. is glycerine but the use of any considerable amount of glycerine causes the resin to absorb water and sweat in humid atmospheres. For some purposes triethylene glycol, tetraethylene glycol, or hexaethylene glycol may be used as a plasticizer. Water unmisable plasticizers such as triacetin and methyl phthalyl ethyl glycolate may be used when water absorption is a problem.

A new hydrophillic resin, polydyhydroxy alcohol, should receive closer study, besides having many of the properties of polyvinyl alcohol, its cold water resistance and hot water solubility should make it of interest in the adhesive trade.

Soyabean Flour

Soyabean flour or meal as well as its treated product "Prosize" has not been mentioned heretofore because it can be substituted for and reacts to treatments similar to casein although not giving the same strength that casein gives.

Casein

Chemically, casein is a protein having albuminous characteristics; actually it is

an amino mystery. In its simplest form, it is nothing more than unseasoned cottage cheese. If 18 parts of sodium bicarbonate is added to 100 parts of cottage cheese, on the dry basis, an excellent edible adhesive will result.

From the adhesive standpoint, it ranks highest among all other materials. If, however, best results are to be obtained, the right type must be selected for the particular job. For solutions of low viscosity, the natural soured or lactic acid casein is used; for solutions of high viscosity and lower adhesive strength, the sulphuric acid precipitated casein is used. Never use rennet caseins in adhesive formulations. Rennet precipitated casein is insoluble in most casein solvents, being the base of casein plastics.

There are three distinct types of casein solutions: (1) ammonical solutions (redissoluble); (2) alkaline or base solutions, and (3) alkaline earth solutions. The ammonical solution of casein is made by dissolving 100 parts of casein in from 400 to 700 parts of water and 16 parts by weight of commercial aqua ammonia. It is comparatively weak, is miscible with many other neutral or alkaline colloids and makes a good dispersing agent for resin solutions and hot waxes. A reasonable degree of water resistance can be secured by using 1 to 2% of formaldehyde on the basis of the dry casein. Alkaline or base solution may be made by 100 parts of casein with the aid of from 10 to 16 parts of borax, sodium carbonate, trisodium phosphate, or metso. When caustic soda is used as a solvent, 5 parts is ample to cause solution of the casein.

Heat will assist solution of the casein in both of the above types but should never be used to bring about solution of the third type.

Alkaline earth casein solutions are caused by the inter-reaction of slaked lime, (calcium hydroxide) with a base or a salt. Pure lime will dissolve casein (base of many water paints) but the resultant product is extremely viscous and doughy.

The casein mixtures most used in the packaging trade are the ammonical solutions and the alkaline or base solutions with or without fluid resins or rubber latex dispersed in them. Casein and silicate of soda is an excellent laminant for all kinds of absorbent sheets or webs.

Glue

Bone, hide, and fish glues form a group all their own and to some extent can be used interchangeably. In order to make bone or hide glue fluid and of utility to the laminator, it is treated with acetic or similar acids and if necessary neturalized with a mild alkali. Such glues are miscible with gums or starches to give them greater adhesive strength. Recently the liquefication of bone and hide glue by the addition of urea has increased its value to the laminator: Being substantially odorless and of negligible toxicity, it can be used in many types of sheets, both dense and porous. Water resistance of bone and hide as well as fish glues may be increased by the addition of a small amount of potassium or sodium bichromate, formaldehyde, formic acid or alum. Glycerine, sorbitol, or diethylene glycol tend to make such glues more flexible but at the same time make them more water absorbing.

Fish glue, although possessing a slight odor is a good laminant because of its wide operational limits. Its slower setting time must be taken into consideration when quick tack is desired. This deficiency can be overcome by the addition of more tacky adhesives. Its long spreadable life prevents its drying on rollers or knives or in pans. Not being subject to gellation, uniform thickness can be secured under almost any conditions.

Several other adhesive materials such as peanut meal, corn-cob gum, and lignin may soon be on the market in quantity. They may be used as aqueous cold setting or thermosetting adhesives according to their method of manufacture.

During the first world war and before rubber latex and resin glues had become articles of commerce, blood albumen was used extensively as a water resisting, thermosetting glue. Its use has declined in favor of phenol and urea formaldehyde adhesives but its value as an ingredient of certain thermosetting phenolic glues is being considered.

Silicate of Soda

Last but not least of the better known hydrophillic adhesives is silicate of soda. It is one of the most versatile of the inexpensive laminants. It may be used as is, or with other alkaline formulations. Acid substances precipitate out free silica and make it useless as an adhesive. Aging increases its water resistance, which at first is rather poor. When selecting a silicate for a particular job, the ratio of SiO_2 to Na_2O must be given careful consideration as it affects viscosity, gellation and adhesion to various surfaces. The brands having low soda (Na_2) ratio are termed "short." As the relative amount of ratio of Na_2O to SiO_2 increases, the solution increases in tackness. The shorter the solution the quicker the "set." However, this can be overcome by the addition of colloidal inhibitors such as water soluble gums. Silicate of soda is sold in both solution and soluble powder form. The latter is often an essential ingredient in commercial powdered casein glues. Of all the adhesives, the silicates are the hardest to make flexible or to plasticize, there being no satisfactory flexibilizing agent known other than small amounts of glycerine or natural rubber latex.

When used as an adhesive it adheres wood, veneer, cloth or paper to each other or to metal. When solutions of high solids are used it stays on the surface and does not bleed through the web. Its adaptability to any kind of laminating machine coupled with its property of adhering to almost any surface, makes silicate of soda a useful adhesive.

Silicons

There have been several new adhesive members added to the silicon family. One, "condensed" ethyl silicate is a light brown liquid consisting predominately of tethraethyl orthosilicate with small amounts of polysilicates. The substantially pure tetraethyl ortho-silicate is a colorless liquid having a mild ester-like odor. Both are completely soluble in alcohol. Their utility lies in their property of hydrolyzing of ethyl alcohol and silica acid which in turn dehydrates to a fire resisting adhesive form of silica (SiO_2). Today it is used as a ceramic binder but tomorrow it may be used as a laminant.

A long hoped for addition to the supply of adhesives is found in the silicones. Thermosetting in nature they have excellent moisture resistance and complete lack of carbonization on long exposure to temperatures as high as 250 C. For short periods of time, silicone adhesives will

75% is a sizable reduction in Labor
OWEN
PULPWOOD GRAPPLES
LOWER-HANDLING-COSTS
DISTINCTIVE OPERATION
with INCREDIBLE PERFORMANCE
and approximately that reduction with an appropriate saving was made by a paper concern in Canada. This economy was effected when an Owen Pulpwood Grapple system was installed and consistently outperformed the "old style" sling system.
Write for bulletin.
The OWEN BUCKET Co.
6015 BREAKWATER AVENUE CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

stand even higher temperatures without deteriorating. Being electrically nonconductive silicone adhesives may be used for electrical laminations without fear of fire or breakdown. Their use as an additive agent to other organic solvent adhesives and thermoplastics gives interesting and oftentimes unexpected results.

Hydropholics

Adhesives coming under the other broad classification are the hydropholics. While many of them may be soluble in alcohol, others are soluble in ketones, aliphatic and aromatic solvents such as petroleum naptha, or solvents such as benzol or toluol. This classification includes hot melts, thermosetting and thermoplastic as well as pressure sensitives, cold setting, and solvent laminants. The line of demarcation between some is very little because a hot melt may also be a thermoplastic; a heat sealing laminant, as well as, a pressure sensitive or a solvent adhesive according to the plasticizer and solvent used. Mobility may be secured through heat plasticization or by the addition of a solvent. Asphalt is one of the most common materials that may be used for any of the above may also be applied in aqueous dispersed phase.

Bitumens

The dispersion of petroleum and natural asphalts with the aid of hydrophillic colloids and/or surface active agents such as the alcohol sulphates, and amines such as triethyanolanime or morpholine has given a new series of low cost non-penetrating laminates that were used in making the wartime "V" board. The war measurably increased the use of non-bleeding asphalts as laminating media due to their availability, low cost, nontoxicity, uniformity, and ease of operation. Much of the lead foil-paper combinations used in war packaging was adhered with specially treated asphaltic material. Its rather high moisture vapor transmission, although objectionable, was overlooked because of its low temperature flexibility and high temperature stability. The oxidizing of asphalts in their molten condition with the aid of blown steam and/or air makes what is known as "blown asphalt."

The product is tougher, more flexible and resistant to cold flow and temperature changes than the untreated bitumen. Among the plasticizers that give fluidity and tack to petroleum asphalt and natural gilsonate are: Rosin ester of ethylene glycol, hydrogen rosin methyl ester and the straight rosin methyl abietates. The pentaerythritol resin and resin esters add tack and toughness to asphalts as also do the vinsol ester gums. The hydrocarbon thermoplastic terpen resins, being compatible with asphalt and also with many waxes, and many natural and synthetic resins and film-formers are interesting material to consider when formulating asphaltic mixtures. The addition of resins and petroleum waxes assist in the working of bitumens and also makes a more aqueous dispersible material. Wax lowers the melting point of higher melting asphalts and also lowers their moisture vapor transmission.

Wax

Until comparatively recent years the chief waxes in commercial use were paraffin, beeswax and a few vegetable waxes such as bayberry and carnauba.

Microcrystalline, or amorphous petroleum wax, having a much smaller crystal structure has many properties such as greater adhesion to smooth and rough surfaces than the plain paraffin. The latter material while less adhesive is also less "blocking" and as such is used in breadwraps, household paper, and in sulphite tissues for pressure mounting to platstic films and to lead and aluminum foil. It is also used as a cheapener for the more costly amorphous wax to which it also imparts nonblocking properties. The value of the amorphous waxes comes from their increased adhesive and cohesive strength. The addition of certain alkyd and terpene resins to both types of petroleum wax gives added tack and in some cases, reduces blocking tendencies. It is difficult to mix toughening film formers like ethyl cellulose with wax but the addition of resins compatible to both permits the wax to tolerate the incompatible substance.

Care should be taken in adding resins to wax lest the resins settle out and cause trouble on the application machinery. The "dryer" (containing less oils) the less tendency the wax will have to bleed through laminated papers. "Dry" waxes being less adhesive, may require tacky resins to restore adhesiveness. The dryness generally shows up in the melting point. However, some high melting point tank bottom or scale waxes may not be dry. In this case their penetration number will be high and when placed on clean bond paper, will show an oil halo because of added petrolatums.

The substitution of wax emulsions in the beater when the paper is being made, tends to make the paper more resistant to surface water and aqueous glue penetration. Wax, when emulsified also gives water resisting properties to casein, starch, and other aqueous colloids when they are used as coating or laminants.

The melting points of plain paraffin are generally between 120 to 152 Fahr. Ordinary amorphous wax runs from about 145 to 170 Fahr. While true acetone extracted scale and tank bottom microcrystalline wax starts at around 170 Fahr., and may be secured up to and beyond 200 Fahr. The latter waxes are the purified product of the sludge or settlings from crude petroleum storage tanks. The darker brands may be had at a price considerably lower than the more refined and fully filtered amber brands.

Every resin is a hot melt from rosin to mixtures of polyethylene. Every resin manufacturer can give the table of compatibilities and physical characteristics of his various products. Although hot melts are, by nature, thermoplastic, the reverse is not always true. For instance, a hot melt wax or asphalt is thermoplastic but ethyl cellulose which is definitely a thermoplastic is not used as a hot melt. It does, however, give hot melts toughness and tends to raise their resistance to heat.

The hot melt made by treating alkyd resins with wax during the polymerization of the resins makes an extremely good combined coating and laminant. A tough hot melt may be made as follows:

8 parts ethyl cellulose
42 parts hydrogenated methyl ester of rosin
50 parts hydrogenated rosin.

True thermoplastic laminants differ from hot melts in that while holt melts are applied *hot*, themoplastics as such may be applied hot, calendered or applied in solvent form, and after the solvent has evaporated, cause adhesion by passing the two webs through hot rollers or platens. This permits the ingenuity of the formulator a wide field of operations with any thermo active adhesive substance.

Any discussion of hot melts or thermoplastics if used as heat sealing coatings, would be incomplete without mentioning the amids and the chlorinated natural and synthetic rubbers.

Polyamide Resins

The polyamide resins are only about eleven years old and are, in general, reaction products of polybasic acids and polyfunctional amines. When combined with derivatives of drying oil fatty acids, a new series of hot melt and thermoplastic resin result. The resins are not easily ignited; are resistant to hydrocarbons, oils, greases and gasoline. They resist the action of mild acids, alkalies, and water. They are not tacky; do not block and retain their adhesive strength almost to their melting point. Toxicity reports have been most favorable.

The polyamide resins make good laminants to all types of webs and metallic foils and add moisture vapor impermeability to paper laminations. When dissolved in their proper solvents and plasticized, they may be solvent laid as laminants or as plain or heat sealing coatings or lacquers.

Chlorinated Rubber

The chlorinated rubbers may be applied in solvent phase or heavily plasticized and spread with a knife or calender. Their thermoplastic nature makes them good heat sealers. When added to hot melt compositions, they make the material tougher. The addition of rosin esters, and hydrogenated rosin makes chlorinated rubber tackier. Being extremely fire resistant, it makes a good adhesive for fire resisting laminations and structures. While speaking of fire resistance, the addition of the fire resisting aroclor resins to hot melt compositions should not be overlooked. The same is true of the polystyrene resins. Although not classified as hot melts, they give valuable toughening and chemical resisting qualities to other compatible hot melt materials and increase the cohesive strength of the more crystalline thermoplastics.

Hot melt compositions may also be made by adding about 20% of modified alkyd resin to about 80% vinyl chloride acetate resin with a plasticizer like dibutyl phthalate or tricresyl phosphate.

While most of the hot melt compositions are heat sealing in function, heat

seals as such generally require more toughness and being applied as coatings must be nonblocking, a property not always possessed by hot melts or thermoplastics. Chief among the heat seals might be mentioned plasticized cellulose nitrate, cellulose acetate, polyvinyl acetate, polyvinyl chloride, acetate, and ethyl cellulose lacquers. The prime object in applying heat seals is to apply as high a solid content as possible and to this end a discreet selection of low viscosity resins together with the best solvent must be made. A number of the major petroleum companies are advancing nonblocking resin modified waxes for heat sealing purposes.

Most film formers will make heat sealing coatings but it is the choice of plasticizers that make them satisfactory coatings for certain uses. The choice of plasticizer is so broad that the wise formulator will accept the advice of the manufacturer as to the best plasticizer that is compatible with his product and which will make that product adhere to a certain material.

Thermosetting adhesives, because of the "setting" time element and the elevated temperature needed to bring about polymerization are not meant to be used in continuous web and fast operation. When urea, phenol, melamine, and resorcial are separately combined with formaldehyde or para-formaldehyde thermosetting adhesives of varying qualities are made. The recent types set at much lower temperatures and are workable on some paper laminating machines.

Recently formulated combinations of phenolic resins with polyvinyl butyral have been found to make very good water resisting laminants for paper-plastic- aluminum foil structures.

Urea Formaldehyde

The use of urea formaldehyde for packaging extends chiefly to adding it to starch as a means of improving water resistance. Unadulterated cold setting urea-formaldehyde may be used as a paperboard laminant but care should be taken to note its setting time and clean all apparatus before it begins to "set." If this precaution is not taken, prepare to stop production for a day or so until the machinery is dismantled and the solidified adhesive is chiseled off the apparatus.

The Laminating Operation

Regardless of what make or type of machine is used in the laminating operation, certain requirements are necessary to produce a good laminated product with minimum scrap and maximum production. Among these might be mentioned:

1. The delivery of workable material to the machine rolls of metallic foil indented on edges; plastic material that is wrinkled or blocked; paper too damp or too dry are unprofitable to begin with. A laminant that will settle out, is lumpy or on the point of coagulation, never increases the value of the end product. No operator can produce good results with bad material.

2. The machine must be mechanically perfect. The laminating machine should be inspected daily for rolls out of a true circle; loose bearing or bad alignment. These defects cause wrinkles, uneven tension on the web, and lack of uniform glue application, which shows up in streaks, bulges, or no adhesion at all in the dried web. It is not enough that driven unwind and glue applicator rolls be *nearly* alike, they must be of the same diameter to the thousandth of an inch. A thin web passing between two driven rolls, with only a differential of 0.002 pounds of an inch will soon cause the web to break because of the tension set up by the difference in sizes. There should also be perfect, not merely close, synchronization between the unwound and the rewind stands. Because some laminations may stretch or shrink in the laminating process, it is necessary to be able to vary the unwind and rewound speeds to prevent too much slack or to relieve tension as the case may be.

3. Whatever the drying medium, specific attention should be given to the drying of each type of lamination. Whether hot air; electric or steam plates, infrared ray sun lamps; drying drums or direct flame is used, there should be means for heat control.

4. Cleanliness around the laminating machine is a must. This applies not only to the application rolls, the glue pan, the drying oven or surface but to the floor and surrounding surfaces. Particles of dust, bits of paper, plastics, etc. lying around prevent quick action and are a sign of poor operation which is reflected in poor quality products.

5. Handling of rolls of finished laminations. Considerable loss is often caused in careless handling of material from the rewind through the slitting and spooling operations. Smooth and properly curved dollies or felt patted trucks will do much to prevent deformation of rolls and scuff marks on the finished webs. Workmen should be taught that carelessness and bad material is directly related to his income.

The foregoing are things all average operators and foremen are expected to know. To be really good at their jobs, they should also know the chemical and physical peculiarities of the laminants. Simple adhesives such as the gums, starches, and dextrines, or mixtures of the two do not require much knowledge because being soluble in water, are easy to apply or to thin out if they thicken in the pan or on the application roll. However, they should not be thinned indiscriminately because by thinning the glue solids off balance will also affect the absorption and the drying of the glue. When thinning glues in the machine pan a quick check should be made to insure proper solids and viscosit.y Any change in solids or viscosity different from what the laboratory trial runs have found to be satisfactory, cannot but produce inferior goods. Especially is this true when running, say 10 to 15 pound tissues where too much adhesive will cause wrinkles, web breakage and ridges to build up at the rewind.

Aqueous Emulsions

While most operators are familiar with the difficulties attendent on using dextrines, starches, silicates, and gums, the newer water emulsions and dispersions are causing them some concern. The most commonly used adhesive dispersions in use today are the polyvinyl acetates, and synthetic rubbers of the GRS type 3.

Polyvinyl acetate emulsions are of two types. The natural emulsion formed in the manufacture of polymerization process contains no solvent. It is acid reacting and is generally supported with a neutral water soluble colloid like hide or bone glue or with starch. Several brands on the market are stabilized with polyvinyl alcohol.

The other type of vinyl emulsion is made by dissolving either the polyvinyl acetate or the copolymer of the acetate and chloride in a minimum of suitable solvent and then dispersing the dissolved mass in a water soluble colloid. As in nearly all adhesive emulsions, wetting agents and other agents are added to give required properties.

Before the war, natural rubber latex was used by nearly all laminators. This material would stay in suspension as long as it was kept alkaline with aqua ammonia. Even then it required a stabilizing agent such as glue, starch, or casein. By adding vulcanizing agents, a considerable degree of water resistance can be achieved. When casein is used, resistance to organic solvents is also achieved, which adds to the difficulties of the operator in cleaning application rolls, pans, and bits of glue in the drying oven.

While emulsions of the synthetic latex are water resistant, they are not as resistant on the whole, as the natural latex. All types of resin or rubber emulsions tend to build up on the edges of the applicator rolls due to drying. Small resin or rubber "monkies" are formed and must be sieved out. Hot caustic soda solution sometimes will remove the dried rubber or resin when organic solvents will not or cannot be used because of their detrimental solvent action on rubber rolls. For this reason neoprene or other solvent resistant rubber should be placed on all laminating machines. A roll swollen only slightly will cause trouble. The foreman should always know the type of adhesive being used and the type of rolls on the machines. Even 10% of solvent in a water emulsion of polyvinyl acetate will ruin ordinary rubber rolls in an hour or so.

Waxes

While considerable wax was used in laminating a few years ago, new waxes and combinations of waxes and resins are now being used. Mixture of wax and polybutylene are best applied with a knife or a calender if the polybutylene exceeds 10% of the composition. In all cases combinations of wax and resin or wax and polybutylene should be given an exhaustive laboratory test before being used on the wax mounting machine. A few degrees difference in temperature, speed, or roll pressure may cause trouble in the mounting. Although the line cut or gravure applicator roll has found satisfactory use in all mounting operations, it is especially useful in wax mounting. The

amount of wax can be so easily measured by using different lined rolls. If the wax is chilled on the applied surface and then pressure mounted attention should be given to temperature controls on the chilling rolls as well as on the pressure rolls. If this is not done, part of the lamination will be adhered satisfactorily while other parts will be either loose or will cause blocking in the roll, because of warm wax bleeding through the paper.

When wax mounting metallic foils to dissimilar webs, the difference in contraction and expansion of the several webs must be taken into account to prevent buckling—alligator crazing or wrinkling.

The Curling of Lithographic Papers

ROBERT F. REED, Research Director
Lithographic Technical Foundation

The structure of paper is determined by the particular materials and forces that enter into the papermaking operation. The pulp used may be composed of long or short fibers, or a mixture of both. It may be weakly or strongly beaten, and the action of the beater may be principally to cut the fibers into short lengths or to bruise, shred, and hydrate, without shortening them. The paper machine may be run fast or slow and with more or less crosswise shake of the wire, conditions which determine the amount of "crossing" of fibers. The extent to which the web is pressed while wet, and the degree of calendering it receives when dry, together with degree of beating of the pulp, determine the compactness or density of the finished paper.

Paper, therefore, is a more or less porous felt, the pores or voids of which sometimes amount to half its total volume. It has the characteristics of grain, two-sidedness, and density, all of which contribute to the production of curl under certain definite conditions. In fact the current methods of measuring "curling tendency" make use of the effects of changes in moisture content on the structure of paper in such a way that these three characteristics are the controlling factors.

When the Bureau of Standards curl sizing tester (Carson, Frederick T., and Worthington, Vernon, Measuring the degree of curl of paper, National Bureau of Standards Research Paper RP 1522) is used, the specimen is wetted on one side and maximum degree of curl is attained when the moisture has penetrated halfway through the paper. In this method grain and density are the controlling factors. When the Gurley-Witham curl and shrinkage tester (The Gurley-Witham Curl and Shrinkage Tester. *Paper Trade J.* 111, No. 28, Nov. 28, 1940) is used, the specimen is strongly dried to produce curl, and the controlling factors are two-sidedness and density. Actually, grain and two-sidedness are related in such a way that correlation between the results obtained with these two instruments is very good.

There is another structural characteristic which is an important cause of curl. This characteristic is the presence of residual unrelieved stresses which may be likened to the stresses in metal or glass that has not been annealed. Most machine-made papers are dried under tension so that practically all shrinkage takes place in the cross direction. As the web dries, therefore, the individual fibers are stressed in the machine directions and remain in a stressed condition in the dried web. This stressed condition of the fibers is probably still further increased by calendering.

The presence of unrelieved stresses can easily be demonstrated by moistening a sheet of paper and allowing it to dry again to its original moisture content. Measurements will show that this treatment has caused the sheet to become shorter in the machine direction and sometimes also in the cross direction as a result of relaxation and readjustment of the fibers to reduce stresses to a minimum. It might be said that remoistening has annealed the sheet. Pole and loft-dried papers, which are not dried under tension, show less dimensional change when remoistened and dried than machine-dried papers.

Machine-dried papers retain their unrelieved stresses under normal atmospheric conditions. But if exposed to an atmosphere of sufficiently high relative humidity for the fibers to become limp and flexible, their stresses will be relieved and sheet dimensions will be altered.

The structure of coated papers is more complex than that of uncoated papers. Coated one-side paper is really two different sheets bonded or laminated together. Coated-two-side paper is really a combination of three sheets. The body stock, being fibrous, is the "backbone" of the sheet and gives it its strength properties. The coating, which is non-fibrous, has little strength of itself but sufficient to affect the structural properties of the finished sheet, particularly two-sidedness. The fibrous body stock has grain, and therefore a greater expansivity in the cross direction than in the grain direction, with increase in moisture content. The coating has no grain and tends to expand or contract uniformly in all directions when its moisture content changes.

A coated-one-side sheet, therefore, has a condition of two-sidedness not present in machine-finished paper. This, however, does not necessarily make it more susceptible to curl. The coating is generally applied to the wire side of the body stock, the side which has the greater expansivity in the cross direction, and may actually reduce this expansivity while, at the same time, increasing the expansivity in the grain direction. Thus the coating may make the expansivity of the wire side more like that of the uncoated felt side, and, therefore, reduce the curling tendency of the sheet.

What actually happens depends on the nature of the body stock and of the coating. If the body stock is hard and the coating soft, the curling tendency of the sheet will depend largely on that of the body stock. The harder the coating, however, the greater will be its influence on the curling properties of the sheet. It is the coating mills' problem to so balance the characteristics of the body stock and coating that the sheet will have a minimum tendency to curl.

A coated-two-side sheet generally has less tendency to curl than either machine-finish or coated-one-side paper. This is because of the stabilizing effect of laminating the body stock between two layers of coating of equal and uniform expansivity.

The characteristics of coated papers depend also upon the amounts of coating they carry. In modern machine-coated papers, carrying 3 or 4 pounds of coating per side per ream, the curling tendency is much more like that of the body stock than in enamel papers carrying 12 or 15 pounds of coating per side per ream.

A sheet of paper will be perfectly flat if the dimensions of its two sides in both the grain and cross directions are exactly equal. If it curls toward the felt side, this is because at least one dimension of the felt side is less than the corresponding dimension on the wire side. If it curls toward the wire side, at least one dimension of this side is less than the corresponding dimension of the felt side.

The degree of curl produced depends to a large extent on the structural characteristics of the paper—particularly its density. If it is soft and flexible, the sheet will tend to lie flat because of its own weight and curling will not cause serious trouble. On the other hand, if the paper is dense and rigid, any difference in dimensions of the opposite sides will cause a pronounced curl. And, since papers are invariably more rigid when their moisture content is low than when it is high, the dryer they are the greater is their tendency to curl when these dimensional differences exist.

Two-sidedness contributes to curling since the greater its degree, the more susceptible the paper is to differential dimensional changes, other things being equal. The combination of a high degree of density or rigidity and extreme two-sidedness in paper gives it the greatest tendency to curl.

The types of curl observed in the daily handling of lithographic papers can be divided into three classes according to cause of such dimensional differences:

1. Inherent curl; curl that is built into or acquired by the paper as a result of improper manufacture or handling.

2. Moisture curl; curl caused by non-uniform moisture distribution in the sheet, or to the effect of too much or too little moisture in causing dimensional differences between the felt and wide sides.

3. Structural curl; curl caused by a change in structure of the paper resulting from a lithographic or finishing operation.

There are two principal types of inherent curl—"reel-curl" and "edge-set." Reel-curl, of course, results from sheeting paper too close to the center of the roll. It has two characteristics by which it is easily recognized (1) it is always against the grain (axis of curl across the grain), and (2) it is never uniform from sheet to sheet, but shows up usually only in every fourth, fifth, or sixth sheet in the pile. Reel-curl is usually toward the felt side, but is sometimes toward the wire

side, depending on the mill practice in sheeting from wind-up or rewound reels. It always appears on both ends of the sheets.

Reel-curl, if serious, can cause endless feeder trouble on the press, especially if the sheets curl up. The only possible remedy is to reverse the sheets on the feeder pile so that the curl is down. In fact, the mill sometimes delivers paper wire-side up if reel-curl toward the felt side is evident.

"Edge-set" occurs in case-packed paper if the cases are not packed tightly and are stood for any length of time with the sheets resting on edge. This type of curl, unlike reel-curl, occurs on every sheet, but usually only on one edge. It may be either with or against the grain, depending on which edge was down. It can be avoided by the proper handling of cases in transit and in storage so that the sheets are always in a horizontal position.

The most commonly encountered types of moisture curl are caused by non-uniform moisture distribution in the sheet. This non-uniformity can be of two kinds: (a) Excess of moisture in the felt side as compared with the wire, or vice versa; (b) Differences in the amount of moisture in different areas of the sheets.

An excess of moisture in one side of the sheet may result from (1) exposure of that side to a moist atmosphere, or (2) from liquid moisture picked up from the offset blanket during printing. In pressroom experience, case (1) is relatively unimportant since it occurs in only the top sheet on the pile. Case (2) is more important since it may occur in all sheets, and the curl produced may be serious enough to prevent proper jogging on the press delivery. In either case, the curl is only temporary because the moisture permeates the entire thickness of the sheets in a matter of minutes, and they either flatten out again or take on other type of curl which is permanent and which will be described later. Obviously the only preventive of *press-moisture curl* is to carry a minimum of moisture on the printing plate.

A deficiency of moisture on one side of the sheet can occur temporarily if the pile of paper is exposed to too dry an atmosphere. In this case a few of the top sheets will curl upward.

Differences in amount of moisture in different areas of the sheet can result from various causes. If a pile of dry paper is exposed to a humid atmosphere the edges will absorb moisture and expand while the remainder of the sheets remain unchanged. This expansion, of course, causes the edges, particularly across the grain of the paper, to expand and become wavy. If, on the other hand, a pile of moist paper is exposed to a dry atmosphere the edges of the sheets will lose moisture and contract, particularly across the grain. This condition produces a baggy or tight-edged sheet. Both *waviness* and *tight-edge* are in reality types of curl. Their principal effect is to interfere with register. They can be avoided only by preventing exposure of the pile to any atmosphere not in hygrometric equilibrium with the paper. This can be done by observing the following precautions:

1. Never unwrap a skid or unpack a case of paper until it has first attained temperature equilibrium with the surrounding atmosphere.

2. As soon as the paper is unwrapped or unpacked, test it for variance from equilibrium with the surrounding atmosphere. If the variance is appreciable, the paper should be reconditioned before printing.

3. Keep piles of paper covered with moistureproof material between printings to protect them in case of changes in atmospheric humidity.

Nonuniformity of moisture in paper can also result from non-uniform dampening of the plate during printing. Thus, after the press moisture has permeated the entire thickness of the sheet, there would be one or more streaks from the front to the back edge that contain excessive moisture. If the moist streaks occur at the edges of the sheet, these will become wavy and prevent register in printing succeeding colors. If, however, they occur through the main body of the sheet, no waviness or curl may be immediately evident. But, if this work happens to be a sheet of labels, trouble will be encountered because of curling of some of the labels, but not others, after they are out.

Another type of curl that can be classified as moisture curl is that caused by too much or too little moisture, even though such moisture is uniformly distributed throughout the sheet. Almost any sheet will curl toward the felt side if too moist, and toward the wire side if too dry. This type of curl is due entirely to two-sidedness, that is, to differential expansion or contraction of the felt and wire sides. Curl caused by excessive dryness is always more troublesome than that caused by excessive moisture, because dryness is accompanied by increased rigidity.

Structural curl is the result of a permanent change in the structure of an originally flat sheet. And, practically speaking, there are two ways in which structural change can be brought about in pressroom and finishing operations: (a) Relieving stresses in the fibers on one side of the sheet but not the other; (b) Mechanically breaking a portion of the bonds between the fibers which make up the sheet. As previously stated, most machine-made papers contain unrelieved stresses as a result of being dried under tension, and calendering. If the paper is flat, it is because these stresses are balanced, that is, their total combined effect is the same on both sides of the sheet.

Stresses in paper are retained under conditions of normal moisture content. But if the moisture content is raised above 9 or 10 per cent, the fibers become limp and flexible and rearrange themselves so that the original stresses are relieved. This rearrangement results in the sheet becoming permanently shorter in the grain direction and sometimes also in the cross direction, after it is brought back to its initial moisture content.

Now, if a sheet of paper is moistened on one side only in such a way that the stresses are relieved on that side but not on the other, the moistened side only will change its dimensions and the sheet will take on a permanent curl. In offset printing, for example, the running of excessive fountain water on the plate may cause enough moisture to be picked up and absorbed by the printed side of the paper to soften the surface fibers and relieve their stresses. As the sheet passes to the delivery pile, part of this moisture evaporates, and the remainder quickly diffuses throughout the sheet until its moisture content becomes uniform. In the final condition, however, even though

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the moisture content of the sheet may have been increased 0.2 or 0.3 per cent, this is not enough to relieve stresses in the body of the sheet and only the surface fibers on the printed side will have been affected. The result is that the printed side becomes shorter, usually in both directions, while the back of the sheet expands somewhat in the cross direction. The sheet, therefore, finally tends to curl in two directions: (1) toward the printed side against the grain, and (2) toward the printed side with the grain. Obviously it cannot curl in both directions at the same time, and the curl which is strongest will prevail. The final direction of curl, therefore, depends on the structural characteristics of the individual sheet and there is no sure way of predicting it.

It is common observation that printed sheets arriving at the delivery of the offset press show a curl with the grain and toward the back. That is, the front and back edges curl down. This curl is usually caused by "moisture pickup" as described. It can also be caused by "breaking" of the sheet if the blanket is tacky or if solids are being printed with tacky ink. The amount of curl resulting from moisture pickup, however, depends on:

1. The amount of moisture on the printing plate. The greater the amount of moisture, the greater the curl.

2. The hardness and density of the sheet. A hard bond will curl much more than a soft M.F. paper of the same thickness.

3. The thickness of the sheet. A thin sheet will curl more than a heavier sheet of the same type.

But this curl is usually only temporary and disappears as soon as the moisture has had time to penetrate or diffuse throughout the thickness of the sheet. Then, if the moisture originally absorbed by the printed side was sufficient to relax its surface fibers, a new type of curl will appear which is permanent—a curl that is toward the printed side, often against the grain.

Since structural curl of this type is caused by excessive plate moisture, and since excessive plate moisture may occur during only a portion or portions of a run, it often happens that only part of the printed sheets will curl. Also, since only a portion of the plate may carry excessive moisture, the curl may not be evident until the sheets are cut, when some parts will curl and others will not.

Obviously, when paper is printed on both sides, any curling tendency caused by relief of strains between surface fibers on one side will tend to be counteracted by a similar relief of strains on the opposite side. But when only one side is printed, there is no such compensation, and prevention is the best cure. However, if a printed-one-side job shows objectionable structural curl, this can be remedied, to some extent at least, by the expensive method of running the paper through the press, using a blank plate to apply moisture to the unprinted side.

Mechanical "breaking" of the sheets as a result of excessive force required to peel or strip them off the blanket as previously mentioned, results in another form of structural change which produces curl. The sharp bend as the sheet leaves the blanket causes part of the bonds between the fibers or in the coating on the printed side to break. This produces a permanent curl *with the grain* and toward the back or unprinted side—the same as the temporary curl caused by moisture pickup. The difference is that it is permanent.

The "embossing" of light weight label sheets is in reality a form of curl and is also due primarily to mechanical "breaking" of the sheet in areas printed in solids. In this case, the tack of the ink produces the pull that causes the "break."

There is no practical remedy for curl or embossing which results from "breaking" of the sheet, once this has occurred. Preventive measures, however, include avoiding use of a tacky blanket, use of a minimum of pressure in printing, and keeping the tack of the ink as low as possible.

The Sulphite Process—Its Position in Chemical and Paper Fields Today

REX VINCENT, Technical Consultant
Bulkley, Dunton Pulp Co., Inc.

The sulphite process for the delignification of wood has been practiced for many years, millions of tons of wood pulp have been produced with it, and in spite of what the sulphate process adherents say, it will be practiced for many more years.

One of the prime arguments of the sulphate process adherents is the recent expansion of the sulphate industry. This growth has been so rapid and has reached such a peak that it is phenomenal. Nothing like it ever happened before in the paper industry.

In 1944, there was a total production of sulphate pulps of slightly over 4.5 million tons. Of this total, 3,150,000 tons were consumed as unbleached kraft in the mills that made the pulp.

In the same year, 1944, there was a production of 865,000 tons of bleached and semibleached krafts which was divided into 720,000 tons consumed by the mills which made it and 145,000 tons produced for the market. It is this production which the sulphate process people say is replacing sulphite. Notice, however, that it amounts to only 19% of the total kraft production.

To complete the investigations, these figures must be broken down into market pulp and integrated pulp. The market pulp in the United States is not a small factor as many papers and boards are almost entirely produced in mills which must buy their pulp in the open market.

Market sales by American producers of sulphite pulps rose from about 400,000 tons in 1935 to 1,228,000 in 1941, and then fell to 943,000 tons in 1944. Up to 1941, the ratio of expansion was 3.07 and if calculated up to 1944, the ratio becomes 2.3. This ratio of 3.07 compares rather well with the one for kraft over nearly the same period which was 4.7. Breaking these figures down into the bleached and unbleached components, it is found that unbleached sulphite rose from 82,000 to 460,000 in the period 1935-1941 which gives an expansion ratio of 5.6, higher even than the kraft expansion for that period. Bleached paper grades went from 257,000 to 571,000 or a ratio of 2.2, but note that this refers only to paper grades of bleached sulphite. Since 1941, both these categories have declined in production and the expansion ratio as calculated from 1935 to 1944 would be 2.3 for unbleached sulphite and 1.3 for bleached. This production decline has been due almost entirely to conditions caused by the war and in no way reflects any decrease in facilities for producing these pulps.

In market sales of sulphate, the figures are very similar to those for totally produced sulphate as they rise from only 8,000 tons in 1935 to 377,000 tons in 1944 which is an expansion ratio of 47, but here it must be pointed out that this increase in domestic sales of sulphate was made possible by the shutting off of imports and by the diversion of integrated pulp into the market by the allocation program. Market sales of bleached sulphate have shown a very remarkable rise as they were only 1,500 tons in 1935, 75,000 in 1940, and 99,000 in 1944. This parallels the expansion of totally produced bleached sulphate which increased considerably during the war years.

The rated capacity for all these pulps reached a peak in 1943 and has been declining since then. The increase in kraft capacity has been terrific since 1937, practically doubling in the seven years to 1944, while sulphite capacity changed very little. There has been a considerable conversion from unbleached sulphite to bleached which is shown by the greater decrease in unbleached production than in bleached without a corresponding decrease in total capacity. The market pulp figures do not indicate as positive a shift as do the total pulp statistics and this emphasizes the conclusion that most of the kraft expansion has been made for integrated production. This point is further shown by comparing the market sales of sulphite and sulphate.

In 1939, there was twice as much sulphite sold as sulphate, but in 1943, in spite of the terrific expansion of sulphate pulps, there was two and a half times as much sulphite sold. There is no escaping the conclusion that integrated production is shifting away from the sulphite process and this is due fundamentally to the development of the bleached sulphate grades. In market sales, sulphite, although faced with a rapidly expanding kraft usage, is holding its own.

Since this kraft expansion is largely for integrated production, and has taken place almost entirely in the South, it seems that economics and wood supplies determined which process would be used rather than any inherent advantage that one process possessed over the other. The South offered large areas of timber for the expanding demands, and for paper and board grades of pulp there was not

much choice as to the process—the species of timber settled that question. Those using the sulphate process have long pointed out that the wood species for sulphite are limited and the quality must be high, while the sulphate process can cook almost any kind of wood without being too particular as to its characteristics. Areas which have been providing spruce for sulphite mills were now ready to supply kraft mills with pine and it has been pointed out that this flexibility of demand for raw material would continue to become more and more valuable as prime timber becomes less accessible. But notice that when it was decided, by one company, to produce a purified cellulose from Southern timber, the sulphite process was used and not the sulphate.

There remains now for examination, the imported pulp figures and here again statistics present a problem for they simply do not exist after 1940. Unbleached sulphite has shown a remarkable steadiness in the imports. From 1927 to 1939, the average tonnage on this pulp was about 700,000 tons. The only year it deviated widely from this figure was in 1939 when it rose to 919,000 tons. Bleached sulphite rose slowly up to 1940 and then barely held to 350,000 tons as Canada tried to make up what was lost by the war. In short, the figures on importeJ pulps show very little change in the over-all pattern. In unbleached kraft the same thing is evident—a steady importation of about 430,000 tons a year that broke out in 1936 and 1937 when it went above 600,000 tons. The bleached kraft imports, however, started rising in 1930 when they were 21,000 tons and by 1937 they were up to 111,000 tons. It is known that there is an increased capacity for bleached and dissolving grades of sulphite. The most significant change in the Swedish pulp industry has been the increase in dissolving pulp capacity which has now reached nearly 600,000 tons and all this is based on the sulphite process.

It could hardly be construed that the foregoing statistical review produces a gloomy picture for sulphite. It is true that the small integrated mill, based on the sulphite process, has a problem, but the problem finds its base in wood rather than in the process itself. In the larger, newer units, which are backed by satisfactory timber reserves, there is no inclination to abandon the process and there is an excellent chance that the use of the process will be expanded, although perhaps not for paper.

There is a field for wood pulp where the sulphite process is, today, unchallenged—the so-called dissolving uses where pulp is used as a chemical raw material and not as a building material. These uses are growing rapidly and are dependent entirely on sulphite. The paper industry, by and large, hears very little about these other consumers of pulp and the quantities they require and how they are growing.

By far the largest consumer of refined cellulose is the rayon industry, both viscose and acetate, and currently all the refined cellulose is being produced by the sulphite process. In 1932, to use the same periods as were used for comparison of paper pulps, rayon used 43,000 tons of wood pulp. In 1942, they used 280,000 tons which gives an expansion ratio of 6.5. During that time, pulp increased from 60% to 85% of the raw material used. The production of the industry has been increasing at the rate of about 30,000 tons per year since 1938 and expansions are still going on. Somewhere in the balance between price and requirements, this rayon expansion will stop but it is felt that there will soon be a demand from this industry approaching 350,000 tons annually.

Cellophane is closely linked to rayon because of the similarity of the processes and also because of its rate of growth which has paralleled that of rayon. This material is currently consuming about 60,000 tons per year and expansions are underway which will raise that figure to almost 90,000 tons. For comparison, this is almost as much pulp as is consumed by the glassine and greaseproof papers.

Nitrocellulose should come next in these considerations as it is one of the oldest plastic base materials known. Combined with camphor, it makes that old timer, celluloid. It is still an excellent material and the primary objection, inflammability, has been considerably reduced in recent years. It has never been equaled for wearing quality in film and very few plastics can equal its toughness. Many authorities in the plastics field have been predicting that this material is on the way out but actualities prove them wrong for its production is increasing and in the near future, it will be consuming as much as 35,000 tons annually.

There are many other uses and derivatives that are using wood pulp either directly or as a source of cellulose. The urea-formaldehyde resins employ it as a filler, it is used directly in medical absorbents and sanitary napkins, it is a raw material for methyl and ethyl cellulose, and to some extent for the acetate moulding powders. All these will require about 70,000 tons per year and this, with the major uses spoken of, totals up to approximately 550,000 tons. Any pulp of this type which is exported will increase this figure. Take a round figure of 600,000 tons which assumes an exportation less than that before the war and see what this amounts to.

First, it exceeds the current North American capacity for this type of wood pulp. Secondly, it amounts to about 20% of the total sulphite capacity and about 33% of the bleached sulphite capacity. If those demands are met from North American supply sources, some mills now making sulphite for paper will be making the dissolving grades or new mills will be built—probably both. The market mills can switch from paper to refined cellulose gradually without losing much time and are apt to do just that as prices for those grades move upward and become more attractive. The integrated mill now based on the sulphite process has a different and more difficult problem, the solution of which requires active and continued research.

First, there is the problem of wood supply. There are no clear figures to show just how much hardwood is being cooked by the sulphite process today, but it is known to be increasing and, thanks to the Forest Products Laboratories, will probably increase in the future at a faster rate. There are some figures available on poplar and they show about 600,000 cords being used in 1940, but there is no differentiation there as to process and the figures for more recent years are not clear. The same approach is being used on the West coast where they are cooking more and more white fir and where they are extending the limits of their timber reserves through the use of hydraulic barking and whole log chipping. Thus, while it may not be possible to completely eliminate the wood problem for sulphite, the reserves of spruce and hardwood can be extended considerably.

A second method of solving the integrated mill's problem is through recovery of chemicals and utilization of the fuel value of the waste products. Two of these systems, the magnesium and ammonium base systems, are both untried on commercial scales in America but pilot plant work, on the magnesium base at least, indicates a better recovery of chemicals and heat than can be obtained in the sulphate recovery systems. The ammonium base idea has been used by one mill in Norway with some success. Still another base is being used in Sweden and that is sodium. This system enables the process to accept a rather wide range of wood species and qualities and provides for a considerable variation in characteristics of the pulp. There is an additional method which has had considerable success in Sweden and that is the system for evaporation of calcium base liquor. This system has been worked out for the typical Swedish mill of from 80 to 100 tons per day and it is claimed that a mill of that size can almost be balanced out for fuel. In units of larger size, there is a complication resulting from the ash, the disposal of which is a major problem.

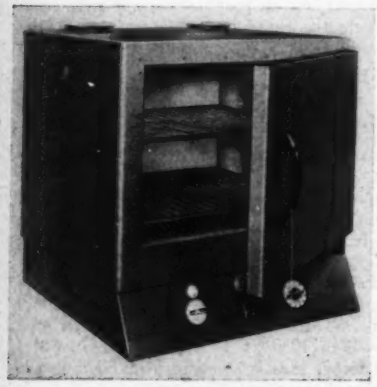
There is still a third approach which is not as advanced as the recovery systems and that is the process indicated by the Forest Products Laboratory's work on holocellulose. This process is a variation of the analytical method for the isolation of holocellulose which is the entire carbohydrate fraction of wood. Pulps produced by this method possess high hemicellulose contents and by virtue of that have some very interesting properties. The yield is much higher than that obtained by the usual sulphite process and estimates of costs, as made by the Laboratory, are within the range of commercial practice. This work has not yet been reported as being in the pilot plant stage but indications are such that it certainly should proceed to that point shortly.

These things will not be neglected, economic pressures will not permit them to be, and they will bring new life to a process which is far from death. The demands on the sulphite pulps from the purified cellulose industries will be a further spur and everyone can rest assured that sulphite pulps are going to be around a long, long time.

NEW EQUIPMENT AND SUPPLIES

Laboratory Oven with Timing Device

K. H. Huppert Company, 6830 Cottage Grove Ave., Chicago, has announced the development of a laboratory oven, Model 5700, which features thermostatically controlled temperatures from 0 deg. to 550 deg. Fahr., with timing device which maintains desired temperatures for various periods of time as individual schedules require. Two large vents on the top of the oven equalize interior heat



as well as remove fumes and gases. A third vent permits entrance of a thermometer into heat chamber.

Interior of the oven is lined with steel and a baked aluminum surface. For special purposes, a stainless steel work chamber is available. Exterior finishes are of two types: black krinkled or green baked enamel.

Interior dimensions are 20 x 15 x 19 in.; outside dimensions, 24 x 26½ x 24 in.

The oven consumes 2800 watts at 110 volts a-c or 220 volts single phase.

Hydraulic Barker

Worthington Pump and Machinery Corporation, Harrison, N. J., has announced a pulpwood barking device that employs water pressure to strip the bark from the wood. Designated as the *Hydro-Barker*, the equipment consists of a ring formed by three nozzle-equipped 120 deg. segments. The nozzles, 12 to a segment, release water at pressures of 1200 to 1400 lb. per sq. in. and at velocities of over 400 ft. per min. to do the barking job.

Two of the three segments are adjustable. They may be drawn together to form a tight circle about a 9-in. log, or expanded to surround a 60-in. log. The number of nozzles to be used may also be controlled. A 12-in log would use half the nozzles; a 60-in. log, the water pressure from the full set.

Two pumps are utilized in the operation of the Hydro-Barker. Each pump consumes approximately 1000 hp. and is capable of pumping 1500 gpm. at pressures exceeding 1200 lb. per sq. in. Less power would be required on a smaller barker.

A special booster air compressor and two air bottle accumulators complete the main essentials of the closed system whereby the barker is operated.

Handling wood of any length at a capacity upwards of half-a-million board feet a day, this barker was developed by Worthington in collaboration with the Soundview Pulp Company, Everett, Wash.

Twin-Unit Outdoor A-C Arc Welder

A twin-unit, outdoor a-c arc welder in a single enclosure has been announced by the Electric Welding Division of the General Electric Company, Schenectady, N. Y. Each of the two circuits in the

welder can be used simultaneously and independently with electrodes up to 3/16 in. in diameter, or combined into one circuit for heavy welding with ⅜-in. electrodes. The units have a current range of from 90 to 270 amperes, when used singly and from 180 to 540 amperes when operated in parallel.

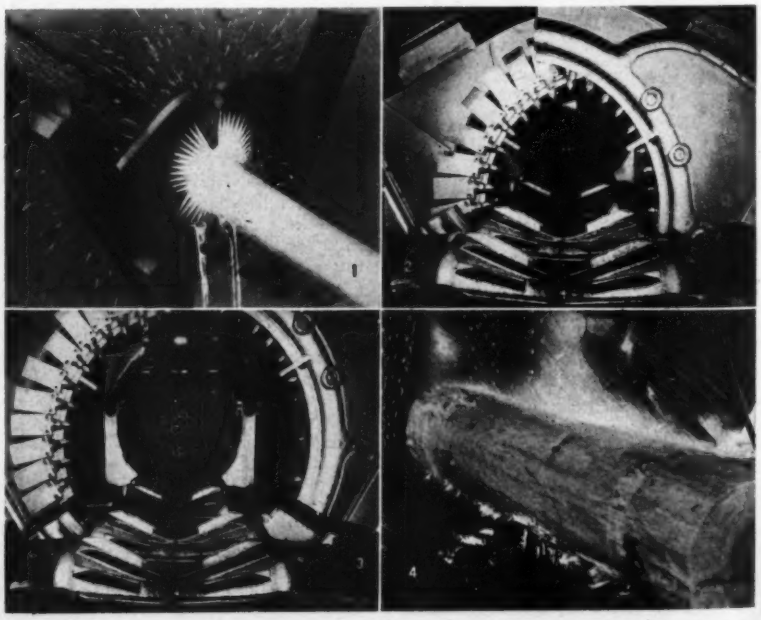
Both welders are equipped with control which reduces the open circuit voltage to approximately 30 volts when the machine is not welding, but which makes full power available the instant the arc is struck. Both halves are supplied through a single set of primary terminals, so that only one power-line circuit to the unit is required.

Protection against rain, snow, and sleet is provided by drip-proof construction of all openings in the top of the enclosure and by a sealed window over the current indicators. Ventilating openings at top and bottom are of such proportions that they shed water and keep the ventilating air velocity low.

New Safety Bridge

Craig-Holden Associates, Box 866, Fort Worth, Texas, has announced the *Butler*

Safety Bridge for use between box car and loading platform. The bridge is of steel construction. It has a positive locking device, side guards and a non-skid surface.



Above: Left-Diagrammatic illustration of operating principle of Hydro-Barker. Right—Ring segments contracted to fit snugly about small log. . . . Below: Left—Ring segments expanded to full diameter. Right—Log being discharged from Barker

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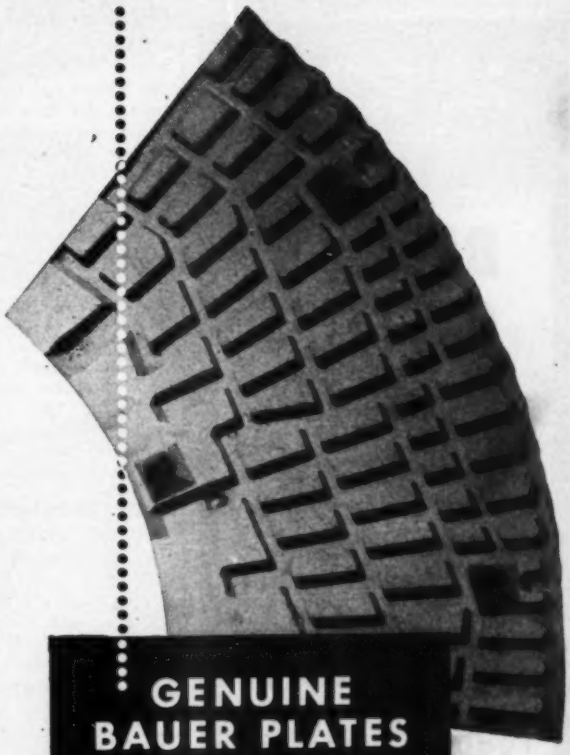

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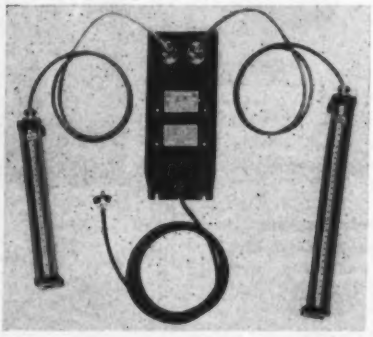
Stainless Steel Welding Fittings

Tube Turns (Inc.), Louisville, Ky., has announced a line of stainless steel welding fittings that include 180° long radius returns, 90° long radius elbows, 45° long radius elbows, straight tees, reducing outlet tees, caps, eccentric reducers, concentric reducers, lap joint stub ends, and laterals and crosses. These items are available in standard and extra heavy weights. In addition, the line includes threaded flanges, blind flanges, socket-type welding flanges, reducing flanges, orifice flanges and lap join flanges. Size range from ¼ in .through 12 in.

The fittings may be had in three grades of stainless steel: Type 304, containing 18% chromium and 8% nickel; type 347, containing 18% chromium, 8% nickel, and approximately 1% columbium; and type 316, containing 18% chromium, 8% nickel, and 2% molybdenum.

Static Eliminator

A static eliminator which utilizes relatively high voltage in eliminating static from paper and other sheet-like materials at processing speeds has been announced by The Takk Corp., Newark, Ohio. A complete unit includes a power pack for either a-c or d-c current and from one to four eliminator bars with necessary electrical wiring. These bars, located



across the static producing material as near the points of friction as possible, eliminate the static by induction from both sides and all through the material.

Although the standard equipment is designed for use on 110-115 volt a-c current, eliminators for use with other voltages also can be supplied. Under normal operating conditions, according to the announcement, there is practically no danger from shock.

New Brown Pigment

A brown pigment, designated as *Auric Brown*, has been announced by E. I. du Pont de Nemours and Company, Inc., Wilmington, Delaware. This new pigment is chemically hydrated ferric oxide. It is characterized by an extremely small particle size; and, according to the announcement, gives very fast-to-light shades on coated and other papers such as those used for wallpaper.

Indicator for Acid-Alkalinity Control

TruTest Laboratories, Inc., 261-263 S. Third St., Philadelphia 6, Pa., has announced TruTest M-E-P Indicator as a new, sharp endpoint indicator for pH control. This indicator changes from green on the alkaline side to an intermediate gray and then to a definite purple on the acid side, or vice versa. The gray tint provides a warning of the approaching endpoint.

One drop of the indicator, according to the announcement, is sufficient for each 25 ml. of titrating volume.

The indicator is available in 1-, 2-, 4-, 16- and 32-oz. bottles with plastic closures and droppers.

Flexible Diaphragm Cloth

Irvington Varnish & Insulator Company, 6 Argyle Terrace, Irvington 11, N. J., has announced a new 80/80 base, Style DL-011 diaphragm cloth. Although developed primarily for use in the automotive field, it is recommended by the manufacturer where strength, flexibility, operating temperatures and resistance to certain solvents are important considerations.

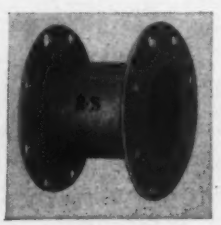
It is available in standard 100- to 500-yard rolls, approximately 37 inches wide.

Positive Shut-Off Butterfly Valve

R-S Products Corp., Valve Division, Philadelphia 44, Pa., has announced a rubber-sleeved butterfly valve with positive shutoff at pressures up to 125 psi. The rubber sleeve, which is in the form of a replaceable spool, fits somewhat loosely within the valve body. Made of a flexible, extremely tough rubber suitable for service within a temperature range of minus 20 Fahr. to plus 200 Fahr., it retains its position without cement or retaining rings.

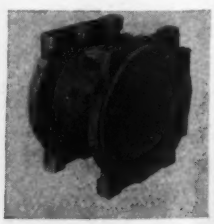
As the butterfly valve approaches closing position, the rubber of the spool bunches up around the entire periphery of the vane as well as at the shaft bosses, thus making the seal.

The valve is available in sizes to handle 15 to 125 psi, using 125 lb. American standard flanges.



Patented renewable replaceable rubber liner

Installing liner in valve body



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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Puncture Tester For Shipping Containers

A simple instrument was devised for measuring the resistance to puncture or stiffness of fiberboard, wallboard, vulcanized fiber, very heavy paper, and similar products. The principle of operation of the instrument, the components, the general usefulness of the method, etc., are discussed. The American Society for Testing Materials has adopted the test as a standard method. Recent experiments carried out at the Bureau of Standards indicate that the instrument can also be used for measuring the strength of multiply waterproof paper, both plain and reinforced. R. L. Beach and C. J. Falk. General Elect. Review 49, No. 8, 36-9 (1946).

Analysis of Fillers in Boards and Papers

This is a great extension in four successive articles of another paper by the same authors abstracted in THE PAPER INDUSTRY AND PAPER WORLD, Vol. 28, 1056 (1946). The kaolin used in papermaking closely approaches the theoretical composition of kaolite. When dried paper that contains kaolin is ashed at 800-850 C. about 12.5% water (due to the kaolin) is lost within 0.5 hr. The regain of moisture is very slow. Even after 18 hours only hygroscopic water (0.55%) is taken up at 20 degrees and 65% relative humidity. This corresponds to the water lost by kaolin at 105 degrees. In determining the kaolin content of a paper, it is essential to determine the ash content of the pulp, and to make due correction for this, and for other mineral components. With an unknown sample of kaolin, it is also advisable to determine the loss of water at 800 degrees. Usually the presence of kaolin in paper may be detected in the ash by determining its solubility in various concentrations of hot hydrochloric acid. In 10N hydrochloric at 100 degrees, approximately 40% of kaolin is dissolved within 0.25 hr. In hot 0.1 N hydrochloric acid, the solubility is about 20%.

After such treatment the acid solution contains largely aluminum ion and appreciable amounts of silica. Iron, calcium and magnesium ions may also be present in traces. The amounts of these components vary with the concentration of the acid used in the test. If either the original kaolin or the ash from a kaolin-treated paper was heated to 900 C., or provided the kaolin was *unheated* before making the solubility tests, the solubility in concentrated acid is very slight. It is evident that the temperature used in ashing a paper sample is critical and that it must be closely controlled. The solubility in concentrated sulphuric acid of kaolin previously heated for 1 hr. at 800 degrees or of unheated kaolin is appreciable, varying between 47.8—55.3%. However qualitative analyses are best carried out in hydrochloric acid rather than in sulphuric acid solution.

In the case of talc, ashing the sample causes a loss of only 1.5% water at 800, and 5.5% at 900 C. Moisture regain is very slight. The talc found in the ash from paper is only slightly soluble in concentrated hydrochloric acid. This is also true for uncalcined talc or for talc that has been heated at 900 degrees. However when talc was used as a filler in paper, treatment with HCl caused sufficient solubility to insure the detection of magnesium ion in the solution. Talc is evidently more soluble in sulphuric than in hydrochloric acid.

Commercial calcium sulphate (containing 2 mols of water) lost about 14.3% water at 105 degrees and about 3.2% more at 800 degrees. If, however, the sample

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also contained some calcium carbonate, then the losses at 800 exceeded 20%. (These were largely CO_2). On ashing paper containing calcium sulphate as loading material, complete dehydration of the ash takes place, and the moisture regain is negligible. Calcined calcium sulphate is almost quantitatively soluble in hot normal hydrochloric acid. Such solutions when tested qualitatively showed the presence of calcium and sulphate ions and small amounts of aluminum, iron and silicate ions as well. In contrast to commercial calcium sulphate the calcium carbonate lost in weight only about 0.7% at 105, but about 42% at 800 degrees. Calcium carbonate was completely soluble in 0.1 N hydrochloric acid.

When magnesium carbonate was used as filler (as in the case of cigarette paper), the loss in weight, on heating to 800 degrees, was about 50%. Commercial titanium oxide was found to contain about 0.3% water and 0.28% loss at 800 degrees as well as 1.1% iron and small amounts of manganese, calcium and magnesium. Its moisture regain after drying was very slight. Despite the fact that titanium oxide was soluble only to the extent of 1.2% in concentrated hydrochloric acid, titanium-ion could be shown by the orange coloration with hydrogen peroxide. When one gram of the oxide was heated with 100 cc. sulphuric acid until white fumes were evolved, and the cold solution was filtered and diluted with water and heated, titanium hydroxide was precipitated. However by these means only about 2.7% of the titanium oxide was recovered. Commercial barium sulphate used as loading material was shown to contain appreciable amounts of silica and small amounts of magnesium, iron and aluminum as well as an aggregate of 2.2% of other indeterminate components. Losses at 800 degrees did not exceed 0.16% and the moisture regain was almost nil Although barium sulphate solubility in hot concentrated hydrochloric acid was slight, sufficient amounts were dissolved so that both barium and sulphate ions were detectable in the filtrates. Such filtrates also contain calcium. When barium sulphate was taken to white fumes with sulphuric acid, and the cold mixture was filtered, diluted with water and *heated*, barium sulphate was recovered from the solution (which originally contained barium acid sulphate).

The above is a resumé of the first three articles of the series. The final article gives a scheme for the analysis of loading materials when these occur in paper. Several grams of the sample are ashed at 800. The ash is then treated with 200cc of cold aqueous hydrochloric acid for 0.25 hr. and the solution is filtered. If calcium sulphate or carbonate was originally present, *large amounts* of calcium-ion will be in the filtrate. (Small traces may be neglected.) The presence of sulphate ion indicates that the paper contained calcium sulphate originally. When an original (unashed) paper sample gives off CO_2 on treatment with acid it contains either calcium or magnesium carbonate as filler. After removal of the calcium (or magnesium) fillers by means of the cold acid, the residue is heated with concentrated hydrochloric acid for 0.25 hr. and filtered. Large amounts of aluminum ion and small amounts of silicates (identified by the molybdenum reagent) indicate that kaolin was a loading material in the original paper.

The filtrate is evaporated to dryness, then taken up in water and filtered from silica, treated with ammonium hydroxide to remove alumina and then filtered. This filtrate was freed from calcium by use of ammonium oxalate, and again filtered. The final filtrate is tested for magnesium. An appreciable test for magnesium ion indicates that the paper originally contained talc. The ash residue that was insoluble in hydrochloric acid is taken to white fumes with sulphuric acid, cooled and filtered. Provided a drop of this filtrate when poured into cold water gives a precipitate, barium sulphate was a loading material. If however the cold diluted filtrate gives an orange coloration with hydrogen peroxide titanium oxide was originally present. The latter may also be tested for by *heating* the diluted acid filtrate, which forms a white precipitate. The tests for mineral pigments like ochre, prussian blue and ultramarine are very briefly discussed. Chene, Deissenberg, Canaud, Martin-Borret, and Chiaverina. *La Papeterie* 68, 226-31; 258-61; 290-1; 326-9 (1946). (Communication in French from the School of Papermaking, Grenoble, France).

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Manufacture of Sulphite Pulp

Patent No. 2,385,955. George H. Tomlinson, Westmount, Quebec, Canada. Application April 8, 1941. Serial No. 387,474. 13 Claims. (Cl. 23—131.)

1. The method of treating the residual liquor resulting from the digestion of cellulosic fibrous material in a relatively pure magnesium base sulphite cooking liquor and separation from the pulp in a pulp washing system which comprises concentrating the liquor by evaporation, burning the combustible organic constituents of the concentrated liquor in a furnace chamber in suspension therein under temperature conditions and for an interval sufficiently brief to obtain a dry ash having a high percentage of caustic magnesia and combustion gases containing a low percentage of sulphur dioxide and substantially all of the ash in suspension therein, separating ash from the combustion gases, then passing unconcentrated liquor into intimate contact with the combustion gases for the recovery of additional ash from the gases and partial evaporation and neutralization of the unconcentrated liquor, completing the neutralization of the partially neutralized and evaporated liquor by the addition of caustic magnesia thereto prior to further evaporation thereof, mixing recovered ash with pulp washer filtrate to form an alkaline aqueous suspension, and passing the ash suspension through a gas absorption chamber in contact with the combustion gases to recover sulphur dioxide.

Treatment of Paper Machine Waste Water

Patent No. 2,380,252. George A. McBride, Grosse Pointe Woods, Mich., assignor to Infilco Incorporated, Chicago, Ill., a corporation of Delaware. Application October 31, 1942. Serial No. 464,138. 9 Claims. (Cl. 210—16.)

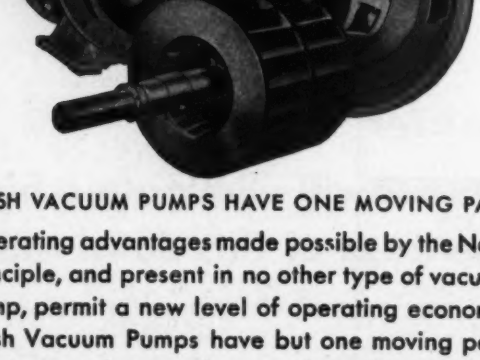
1. A process of mechanically recovering fibers from a suspension thereof, and without addition of a chemically reacting reagent thereto, which comprises maintaining a body of liquid undergoing treatment, said body of liquid being functionally divided into a lower agitated zone containing a thickened suspension of similar fibers accumulated from previously treated suspension and a superposed quiescent clarified liquid zone, passing entering liquid containing fibers through said zone containing a thickened suspension of similar fibers, continuously agitating the contents of said last mentioned zone so that newly entering fibrous suspension is mixed through and incorporated in the thickened suspension, whereby newly entering fibers are entrapped by and retained within said thickened suspension, withdrawing clarified liquid from the upper surface of said thickened suspension into said clarified liquid zone, and withdrawing liquid containing fibers from said thickened suspension to control the accumulation of fibers therein.

Method and Apparatus for Purifying Paper Pulp

Patent No. 2,379,411. Andre Bergès, Lorp par St. Lizier, Arriege, France; vested in the Alien Property Custodian. Application July 5, 1938. Serial No. 217,628. In Germany July 10, 1937. 11 Claims. (Cl. 92—28.)

1. Apparatus for continuous purification particularly of paper pulp comprising a principal vessel of circular cross-section, a top member having an inlet of spiral form arranged circumferentially on said vessel adapted to introduce the paper pulp to be treated tangentially at high speed, said top member having an outlet for the purified pulp centrally of said inlet, a circular baffle located concentrically within

SIMPLICITY



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said vessel and below said outlet adapted to form therewith a comparatively narrow and deep annular gap and substantially dividing the vessel into two parts, said baffle having a central opening, and a central open-ended pipe of comparatively small diameter fitted in said opening and extending upwards through the top of the vessel.

Method of Coating Paper

Patent No. 2,388,339. Clarence Paxton and Thomas H. Vail, Hamilton, Ohio, assignors to The Champion Paper and Fibre Company, Hamilton, Ohio, a corporation of Ohio. Application April 21, 1942. Serial No. 439,862. 5 Claims. (Cl. 117—64.)

2. Process of making coated paper which comprises applying aqueous suspension of mineral pigment and adhesive to a web of paper, spreading and smoothing the coating by contacting the coating while in a substantially fluent state with reversely turning rolls, and steaming the paper in the zone where the rolls contact the paper.

Coated Paper

Patent No. 2,386,700. Frank H. Manchester, Akron, Ohio, assignor to Wingfoot Corporation, Akron, Ohio, a corporation of Delaware. No Drawing. Application November 20, 1943. Serial No. 511,173. 2 Claims. (Cl. 117—155.)

1. Paper coated with a mixture composed essentially of rubber hydrochloride and a benzenesoluble copolymer of vinyl chloride and vinylidene chloride and containing 5 to 95 parts of the rubber hydrochloride and 5 to 95 parts of the copolymer, the copolymer being formed from about 45 to 70 parts of vinylidene chloride and 30 to 55 parts of vinyl chloride.

Continuous Flow Apparatus for Testing Pulp Freeness

Patent No. 2,379,835. Charles Oland Sisler, Sault Ste. Marie, Ontario, Canada. Application February 5, 1944. Serial No. 521,247. 6 Claims. (Cl. 73—63.)

1. Apparatus for continuous testing of pulp freeness, comprising a mesh belt moving at a constant predetermined rate of speed, a constant level chamber for the stock, means for carrying a continuous flow of sample pulp stock from a paper pulp system to said constant level chamber, means for adding liquid to the stock in predetermined volume, means for mixing the stock and liquid to provide a uniform mixture, means for carrying the stock from the constant level chamber to the mesh belt, means for collecting the liquid from the stock that passes through the mesh belt, means for carrying off the liquid thus collected in a continuous flow, and means for measuring the rate of flow of such liquid in the latter means.

Paper Currency

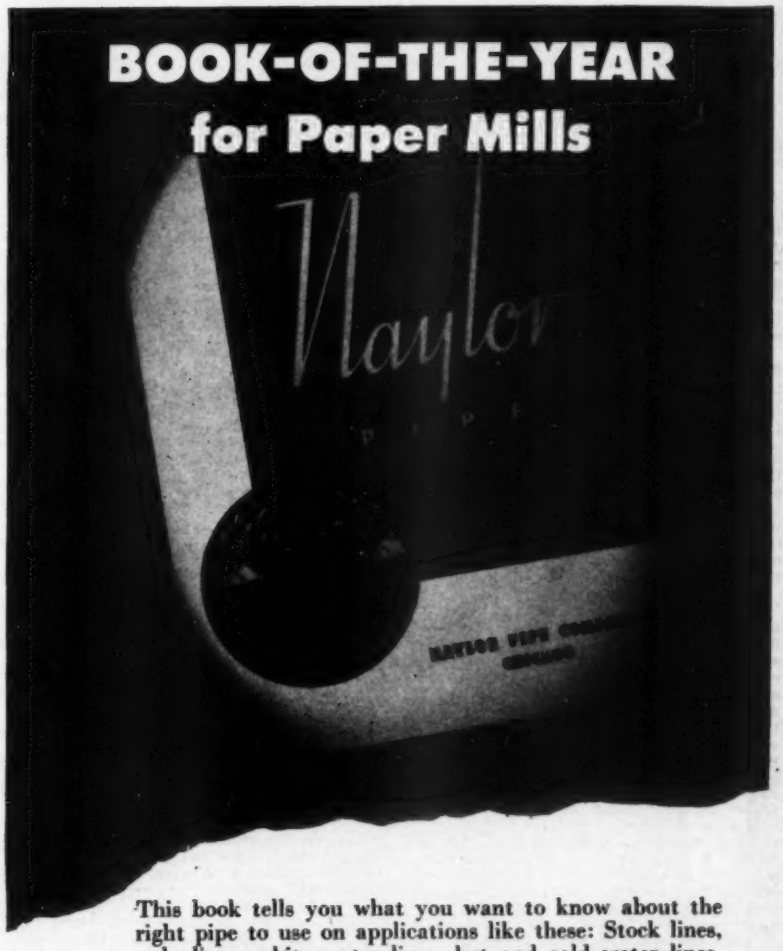
Patent No. 2,384,667. Charles G. Dowd, Fetters Hot Springs, Calif. Application April 14, 1944. Serial No. 531,048. 5 Claims. (Cl. 283—8.)

3. Currency comprising sheets of thin paper adheringly secured in face to face engagement with each other, and an arrangement of metal strands disposed between said paper sheets and consisting of endless strands in concentric relation to each other and other strands crossing the endless strands and secured in conductive engagement therewith, one of the last mentioned strands having portions projecting from the endless strands and terminating in a steel ring at marginal edges of the paper sheets.

Process of Manufacturing Identifiable Paper

Patent No. 2,379,443. Morris S. Kantrowitz and Earl J. Gosnell, Washington, D. C. No Drawing. Application March 15, 1943. Serial No. 479,186. 2 Claims. (Cl. 92—21.) (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.)

1. The process of manufacturing identifiable paper which comprises forming an aqueous suspension of cellulosic fibers containing about 1.5 per cent by weight cellulose, incorporating with said suspension about 20 per cent by weight based on cellulosic content, of hydrated ferric chloride, hydrolyzing said ferric chloride and precipitating colloidal ferric hydroxide in said fibers by heating said suspension to a temperature of about 140 degrees F., then incorporating about 0.8 per cent based on dry weight of the thus-treated fibers in a paper base stock, and then forming paper from the resulting mixed stock, whereby the resulting paper is latently identifiable.



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New Catalogues and Publications

Duriron Co., Inc., The, Dayton 1, Ohio —The over-all manufacture of corrosion resisting equipment by Duriron is presented in a twenty-page booklet which catalogues new alloys and materials recently developed. Production facilities are described, and the composition and application of the various products are outlined. The catalogue is identified as "General Catalogue H." . . . Bulletin 1102 recently published and available on request gives complete engineering data on the five standard sizes of fans manufactured by this company. Included in the booklet are dimensions, capacity ratings, and descriptive matter covering corrosion resisting alloys of which the fans are made. Typical installations for the fans are shown by drawings, and a discussion of the types of drives employed is given.

Farrel-Birmingham Co., Inc., Ansonia, Conn.—A forty-six-page bulletin, No. 447, entitled, "Farrel Gearflex Couplings," completely catalogues various types of couplings for use in industrial and marine service. The booklet contains photographs, drawings of installations, and editorial descriptions of the couplings. Engineering data covering ratings, dimensions, and weights, are also given.

Goodrich Co., The B. F., Akron, Ohio —A ten-page booklet covering the line of industrial protective clothing manufactured by this company describes new products recently developed in the field, pictures of each garment are given, the functional advantages of the clothing are discussed, and construction methods and materials are described.

Honan-Crane Corp., 803 Indianapolis St., Lebanon, Ind.—In a four-page folder issued by this subsidiary of Houdaille-Hershey Corp.) information relating to the prevention of stop-down time and expensive maintenance on hydraulic presses, machine tools, plastics molding presses and machines, die casting presses, balers and injection molding machines by use of effectively purified hydraulic oils is given. Honan-Crane's oil purification is described and illustrated and typical installations are outlined.

Liquid Conditioning Corp., 423 W. 126th St., New York 27, N. Y.—In two bulletins published by this company, modern filters of various types are described. Bulletin 1 outlines the types of clarifying filters, and bulletin 3 gives a concise picture of the oil removal filters marketed by the firm. LIQUON chemical feeders are explained with design and application data in Bulletin 1, and the company's sludge contract reactor for coagulating and removing suspended impurities in raw water is detailed.

Mine Safety Appliances Co., Pittsburgh 8, Pa.—In a four-page digest, Bulletin No. DR-3, the MSA Carbon Monoxide Alarm is described. Designed for efficient protection against dangerous concentrations of carbon monoxide in the air around blast furnaces, in steel mills, chemical plants, and public garages, the alarm gives visible and audible warning when the carbon monoxide concentration reaches dangerous proportions. . . . Construction, operation, and industrial applications of the MSA Hose Mask and auxiliary equipment are contained in the six-page bulletin, No. EB-5. The masks are designed for safeguard against the hazards encountered around tanks, vats, general plant work, and blast furnaces.

Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.—"Heat Operations in the Plastics Industry" is the title of an informative five-page study explaining the application of heat molding, extrusion, casting, laminating, coating, impregnating, and application of adhesives. The function of heat in the processing plastic materials is considered in detail.

Sun Oil Co., Philadelphia 3, Pa.—A newly published folder lists the Sun "Job-Proved" products for industry. Cutting oils, general lubricants, diesel oils, solvents, greases, and waxes are catalogued, and information concerning each industrial application is given.

Swenson Evaporator Co., The, (Div. of Whiting Corp.), Harvey, Ill.—The publication of three new, six-color, flow diagrams has been announced by this company. The diagrams give a graphic presentation of the systems of effective and economical pulp washing. These prints show respectively, a Three Drum Five-Stage Pulp Washing System, a Two Drum Four-Stage Pulp Washing System, and a Single Drum Two-Stage Pulp Washing System. The flow diagrams are printed on heavy 16½"x11" white paper, suitable for framing or inclusion in reference books.

Thomas Flexible Coupling Co., Warren, Pa.—The latest engineering catalogue published by this company is available. Information covering the complete line of couplings manufactured by Thomas is related in the publication which is fifty-seven pages in length, amply illustrated, and bound in handbook form. Besides pertinent data on the existing couplings manufactured by the company, additional information covering three new type couplings has been included.

Worthington Pump and Machinery Corp., Harrison, N. J.—A new bulletin, W-350-B1H, issued by this company catalogues the type CG acid and alkali resistant pumps manufactured by the firm. Specifications, applications, sectional diagrams, performance curves and complete engineering data are contained in the booklet. Additional sizes of pumps which have been developed increase coverage to 200 feet and 1200 GPMs. Recent additions are included in the digest.

BOOKS

Annual Reports—How to Plan and Write Them—Written by Beatrice K. Tolleris, this work is a paper-covered publication of 40 pages (8 in. by 10 in. page size). The contents include: It's All in the Way You Look at It, Organizing Your Facts, Getting Acquainted with Your Audience, Telling Your Story, Tackling the Problem of Statistics, and Planning the Physical Format. The price of the brochure is $1.00 a copy (progressively reduced rates for orders of 10 or more copies). National Publicity Council, 130 East 22 St., New York 10, N. Y., is the publisher.

Forest Products and Utilization—This publication, also designated as section 3 of Forestry Abstracts, is a new quarterly abstract series of the Imperial Forestry Bureau, Oxford (England), on the utilization of wood and other forest products. It will provide abstracts of current literature on the properties of wood, harvesting and logging, wood working and products of mechanical conversion, seasoning and drying, chemical utilization, minor forest products and timber constructional works, and also occasional reviews of progress in selected fields of applied research.

The annual subscription to this new abstract publication is 10 *s.* 0 *d.*; single parts 3 *s.* 0 *d.* Address correspondence to Imperial Agricultural Bureaux, Central Sales Branch, Penglais, Aberystwyth, Great Britain.

Metco Metallizing Handbook (Fourth Edition)—The text of this handbook is divided broadly into five major parts: namely, Surface Preparation, Spraying Technique, Corrosion-Resistant Coatings, Finishing Sprayed Metal, and Metallizing Wires. Illustrated with pictures, drawings, diagrams, charts and graphs, the book presents both practical and technical aspects of the Metallizing Process. Paper-covered and of pocket size, the handbook, totaling 86 pages, is priced at $2.00 a copy. The author and publisher is Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y.

Paper and Pulp Makers Directory of Sweden, Norway, Denmark, and Finland (1946/1947 edition)—Published in English, this book furnishes pertinent directory information about the pulp and paper mills of Sweden, Norway, Denmark, and Finland, the information being arranged by countries in the order given. In addition to the directory of mills, the book contains a section on general trade rules, an index of production, an index of trade marks, and a map showing the location of the various mills in the several countries. This map, not bound with the text, is folded to permit placing in a pocket on the inside back cover of the directory.

Hugo Brusewitz, Lasarettsgatan 6, Gothenburg, Sweden, is both editor and publisher of the volume. Ewert Landberg, Managing Director of the Swedish Paper Mills Association, Major Bjorn Lyche of the paper merchandising firm of Jens Lyche, and Onni O. Ojala, Editor of the Finnish Paper and Timber Journal, were collaborators.

Priced at Sw. Cr. 15,-plus postage, the book may be ordered from Albert Bonniers Publishing House, 665 Lexington Ave., New York, N. Y., or direct from the publisher.

The Paper Industry—A non-technical presentation, this book of 128 pages, written by Josephine Perry, opens with a brief history of paper. Then, it takes up the early growth of papermaking in America, fibers used for papermaking, trees: a great renewable resource, processes of making pulp, preparation of the pulp, papermaking, paper industry, some uses of paper, and the converting plant, research in the by-products of the paper industry. The book is concluded with a chapter touching upon an appraisal of the future of the industry. The publisher of the book is Longmans, Green and Co., Inc., 55 Fifth Ave., New York, N. Y. Its price is $2.00 a copy.

Where to Find Information on the German Chemical Industry—A bibliography covering 344 listings, this paper-covered booklet is the work of L. Wilson Greene, Senior Consultant, Chemical Corps Technical Command, U. S. Army. There also is included a list of periodicals with the address of the publisher of each, as well as subject index.

The price of the booklet is $1.00 a copy; the source, L. Wilson Greene, 54-D Oak Grove Drive, Baltimore 20, Md.

Wood Yeast for Animal Feed (Bulletin No. 12)—The text of this paper-covered book, published by the Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn., is divided broadly into two parts.

Part I reports on feeding tests with wood yeast by the Animal Nutrition Laboratory of the University of New Hampshire. In addition, it reviews recent studies in Germany as well as feeding experiments abroad.

Part II deals with the production of wood yeast. The official government report of American investigators covering the production of wood sugar in Germany and its conversion to yeast and alcohol is reproduced in it in full. Also costs under American conditions are summarized, and further desirable research is outlined.

The book, totaling 198 pages and priced at $2.00 a copy, is available direct from the publisher.

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CURRENT MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

Quotations to consuming mills, cents per pound or dollars per hundred pounds, f.o.b. New York, follow:

(All Prices Are Nominal)

	per cwt.
Blue Overalls	8.50 to 9.00
Corduroy, Men's	5.00 to 5.50
Corduroy, Ladies'	5.00 to 5.50
Washables, No. 1	5.00 to 5.50
Percales	7.00 to 7.50
Light Prints, No. 1	6.50 to 7.00
Khaki Cuttings—	
Bleachable	6.50 to 7.00
Unbleachable	5.50 to 6.00
New White Canvas	9.50 to 10.00
New Mixed Blacks	4.50 to 5.00
Canton Flannels, Bleached	10.00 to 10.50
Shirt Cuttings—	
New White No. 1	10.50 to 11.50
White Shrunk	8.50 to 9.00
Silesias No. 1	8.00 to 8.50
New Unbleached	11.00 to 12.00
Fancy	6.00 to 6.50
Linen Cuttings—	
American	9.00 to 10.00
White	15.00 to 16.00
Grey	14.00 to 15.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

(All Prices Are Nominal)

	per cwt.
Bedding—	
No. 1	2.10 to 2.20
No. 2	2.00 to 2.10
No. 3 and No. 4	1.90 to 2.00
Twos and Blues—	
Repacked	4.00 to 4.50
Thirds and Blues—	
Repacked	3.50 to 4.00
Miscellaneous	3.00 to 3.50
Whites, No. 1—	
Repacked	5.00 to 5.50
Miscellaneous	4.50 to 5.00
White, No. 2—	
Repacked	4.00 to 4.50
Miscellaneous	3.50 to 4.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shapperies	

ROPE and BAGGING

f.o.b. and ex dock New York City

(All Prices Are Nominal)

	per cwt.
Gunny No. 1—	
Foreign	Nominal
Domestic	$5.00 to 5.25
Wool Tares—	
Light	5.00 to 5.25
Heavy	5.25 to 5.50
No. 1 Scrap Bagging	4.00 to 4.50
Manila Rope—	
No. 1 large	6.25 to 6.75
No. 1 small	5.25 to 5.75
Sisal Rope—	
No. 1 large	5.25 to 5.75
No. 1 small	4.75 to 5.25
New Burlap Cuttings	5.50 to 6.00
Jute Threads—	
Foreign (Nom.)	6.50 to 7.00
Domestic	6.00 to 6.50
Strings—	
No. 1 sisal	4.50 to 5.00
No. 2 sisal	4.00 to 4.50
Soft jute	5.50 to 6.00
Mixed	2.25 to 2.75

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

(All Prices Are Nominal)

	per ton
Shavings—	
Hard White Env. Cuts	125.00—
Hard White, No. 1	110.00—
Soft White, No. 1	90.00—
Soft White, One-Cut	100.00—
Soft White, Misc.	80.00—
Fly Leaf, No. 1	45.00—
Fly Leaf, Woody, No. 1	40.00—
No. 2 Mixed Col. Woody	30.00—
Flat Stock—	
No. 1 Heavy Books and Magazines	40.00—
Mixed Books	28.00—
Ledger Stock—	
No. 1 White	65.00 to 70.00
No. 1 Mixed (Colored)	55.00 to 60.00
Manilas—	
New Env. Cuttings	90.00—
New Env. Cuts, One-Cut	—
Extra Manilas	—
Manila Tab Cards, Free of Ground Wood	70.00—
Colored Manila Tab Cards	55.00—
Kraft—	
New Envelope Cuttings	80.00—
Tripled Sorted No. 1 100%	70.00—
New 100% Cor. Cuts	65.00—
No. 1 Old Assorted	55.00 to 60.00
News—	
White Blank	45.00—
Overissue	40.00 to 42.00
No. 1 Baled	29.00 to 30.00
Old Corrugated Containers	31.00 to 32.00
New Corrugated Cuts	38.00 to 40.00
Mill Wrappers	—
Box Board Chips	—
No. 1 Mixed Paper	21.00 to 22.00

CHEMICALS

f.o.b. shipping point

(All Prices Are Nominal)

Alum (Papermakers)—	
Lump, cwt.	4.25—
Ground, cwt.	4.00—
Powdered, cwt.	4.40—
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to —
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	—
80-100 mesh (bags), lb.	(N) 47.00 to 50.00
Argentine, lb.	(N) 50.00 to 52.00
China Clay—	
Domestic Filler Bulk (mine) ton	8.00 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	22.00 to 25.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	.55 to .55½
Litharge, powd., bbl. lb.	09¾ to .10¾
Rosin (Gum)—	
New York, per 100 lbs.	
E	8.50—
F	9.05—
G	9.06—
WW	9.06—
Rosin (Wood), carlots	6.50—
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to —
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30—
Ground and flake, drums, cwt.	2.70 to 2.95
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works), cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	5.87—
Pearl, barrels, cwt.	5.98—
Paper (Sp.) bags, cwt.	5.98—
Powdered, barrels, cwt.	6.02—
Sulphur (Crude)	
(Mine) bulk, long ton	16.00 to —
Talc—	
Dom. 100 lb. bags (mine) ton	16.00 to 28.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06¾
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide bbls., lb.	8.25 to 8.50

WOOD PULP

Prices, dollars per short, air dry, ton, on dock American ports and f.o.b. shipping points with former OPA freight allowances, are:

(All Prices Are Nominal)

Bleached sulphite, Swedish	120.00—
Bleached sulphite, Finnish	165.00—
Bleached sulphite, domestic	115.00—
Easy bleaching sulphite	—
Unbleached sulphite, Swed.	94.50—
Unbleached sulphite, Fin.	132.50—
Unbleached sulphite, dom.	100.00—
Unbleached kraft, Swedish	89.00—
Unbleached kraft, Finnish	128.50—
Unbleached kraft, northern	95.00 to 97.50
Unbleached kraft, southern	90.00—
Bleached sulphate, Swedish	124.50—
Bleached soda, domestic	105.00 to 110.00
Sulphite screenings, dom.	—
Sulphate screenings, dom.	—
Groundwood, domestic and Canadian	70.00 to 80.00

PAPER

f.o.b. New York City

(All Prices Are Nominal)

Boards—	
Binders	94.00—
Chip	65.00—
Chip, tube and can	67.00—
Chip, full-blending	70.00—
Chip, krf. mla. lined	80.00—
Coated, white patent .018	101.50—
.020 and heavier	90.00—
Kraft liner	84.00—
Filled News	70.00—
Container	84.00—

Book Papers—f.o.b. mill with quantity, weight, manufacturing and other differentials allowed:

Uncoated (Untrimmed)

Book, White (M. F.)—	
A Grade E. F.	—
B Grade E. F.	—
C Grade E. F.	—
D Grade E. F.	—
No. 2 Uncoated Offset 4 sides, White	—

Coated White (Trimmed 4 sides)

No. 1 Glossy	—
No. 2 Glossy	—
No. 3 Glossy	—
No. 4 Glossy	—
C2S Offset	—
C1S Litho (Varnish)	—
C1S Litho (Non-Varnish)	—

Writing Papers—f.o.b. mill with zone, quantity, packing and other differentials allowed:

Rag Content Bond—

	per cwt. 20 lb.	16 lb.
Extra 100% Rag	—	
100% Rag	—	
75% Rag	—	
50% Rag	—	
25% Rag	—	

Rag Content Ledger—

	per cwt. Extra
Extra 100% Rag	—
100% Rag	—
85% Rag	—
75% Rag	—
50% Rag	—
25% Rag	—

Sulphite Bond—

	per cwt. 20 lb.	16 lb.
Air dry, watermarked	—	
No. 1 (M.F.) watermarked	—	
No. 2 (M.F.) watermarked	—	
Plain (M.F.) unwatermarked	—	

Sulphite Ledger—

	per cwt. Extra
No. 1 (M.F.) watermarked	—
No. 2 (M.F.) watermarked	—
Plain (M.F.) unwatermarked	—

Glassine (f.o.b. mill)—

	per cwt.
Embossed (25 lbs. up)	—
Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—
Greaseproof— Bleached (25 lb. up)	—
Unbleached (25 lb. up)	—

News—

	per ton
Rolls, Standard (Contract)	84.00—
Rolls (Spot)	(Nominal)
Sheets	103.00—

Tissues (Carlots)—

	per ream
White No. 1	1.35—
White No. 2	—
Bleached Anti-Tarnish	—
Colored	—
Anti-Tarnish Kraft	—
Manila	—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.70—
Napkins, full crepe and embossed (12½ lb. to M shts.) per cs.	.70—
Toilet, Bleached (M shts.) per cs.	7.00—
Toilet, Unbleached (M shts.) per cs.	5.50—

Towels—

	per case
Bleached	4.25—
Unbleached	3.75—

Wrappings (Kraft)—

	per cwt.
Super-Standard	6.25 to 7.00
No. 1 Wrapping	6.00 to 6.50
Standard Wrapping	5.75 to 6.25
Standard Bag	5.75 to 6.25
Variety Bag	—

Wrappings (Sulphite and Bleached Kraft)— (Rolls, f.o.b. mill)

Bleached Papers—

	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only (10,000 lbs.)	—
Drug wrapp., 35 lb.	—
Unbleached Papers— Com. Gr. Butch. 40 lb.	—
No. 1 Butchers	—
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite, 30 lb.	—
Steam Finish, 50 lb.	—
Water Finish, 50 lb.	—

Manilas—

Envp. Mla., Sub. 16-40 (No. 1)	—
Envy. Mla., Sub. 16-28 (No. 2)	—
Envy. Mla. (Prices based on large sheets untrim'd ream-marked, in bdls.)	—
Wrapp. Mla. 35 lb. up—	
No. 1	—
No. 2	—
M.G. Sulphite and Kraft (other than Waxing)	
Grade B20 lb.	—
Grade A-32 lb.	—

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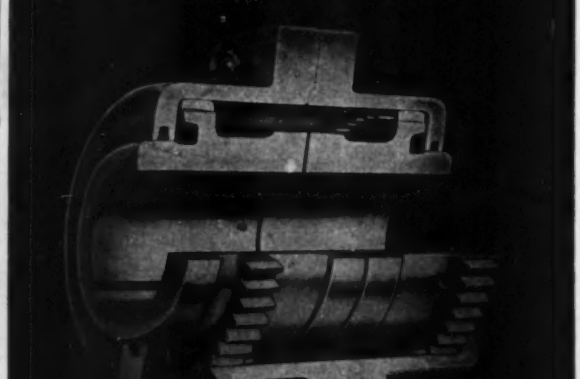
POOLE



A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

FLEXIBLE COUPLINGS

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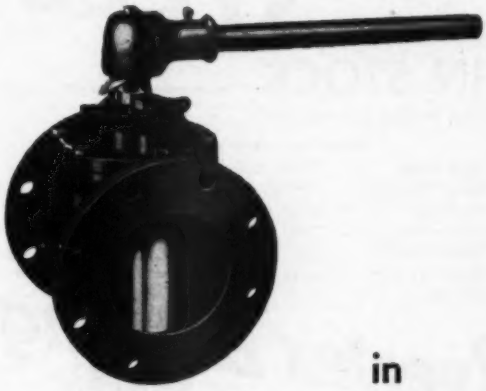

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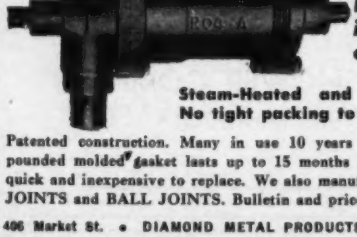

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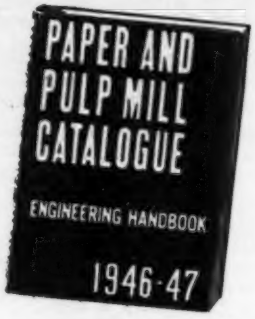

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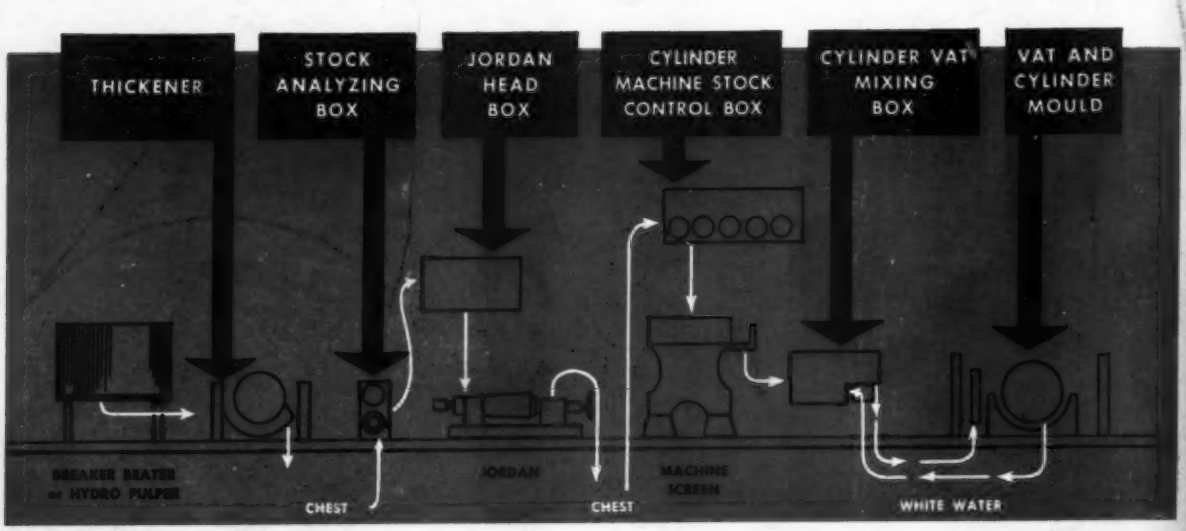

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